InterPore2020
12th ANNUAL MEETING

CONFERENCE PROGRAM
31 August - 3 September 2020
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ORGANIZING COMMITTEE

Oleg Iliev (Chair), Fraunhofer Institute, Germany
Lei Zhang (Co-Chair), China University of Petroleum, China
Alberto Guadagnini, Politecnico di Milano, Italy
S. Majid Hassanizadeh, Utrecht University, The Netherlands
M. Sadegh Rias, University of Cincinnati, USA
Matthijs de Winter, Utrecht University, The Netherlands

PROGRAM COMMITTEE

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Rainer Helmig (Co-Chair), Stuttgart University, Germany
Matthias Appel, Shell Global BV, The Netherlands
Rafid Al-Khoury, Delft University of Technology, Netherlands
Inga Berre, Bergen University, Norway
Al Cunningham, Montana State University, USA
Anozie Ebigbo, ETH Zürich, Switzerland
Sebastian Geiger, Heriot-Watt University, UK
Gennady Gor, New Jersey Institute of Technology, USA
Adrienne Phillips, Montana State University, USA
Sorin Pop, University of Hasselt, Belgium
Amir Raoof, Utrecht University, The Netherlands
Tiina Roose, University of Southampton, UK
Veronika Schleper, Bosch, Germany
Sridhar Ranganathan, Kimberly-Clark Corporation, USA
Stéphane Zaleski, University Pierre and Marie Curie, France

We are so glad to welcome you!
Dear Colleagues,

On behalf of the Executive Committee, I welcome you to the 12th International Conference on Porous Media and Annual Meeting of the International Society for Porous Media (InterPore). This multidisciplinary international annual meeting is the focal event for the diverse porous media community, bringing together professionals and students to learn about new and exciting advances in porous media studies that cut across disciplines with participants from across the globe. Presentations at the Conference encompass all aspects of porous media from the nano-scale to the scale of reservoirs and address many of societies pressing concerns such as global water quality and scarcity, geothermal energy, CO2 sequestration and fuel cells, as well as fundamental studies related to transport and deformation of biological tissue, topological insight into geometric evolution of fluids, and scale-dependent behavior.

We appreciate your support and participation in InterPore’s first virtual Annual Meeting. With the current unknowns related to the COVID-19 pandemic, it is important for the community and the Society to respond and develop appropriate methods to maintain communication and the exchange of ideas under restricted travel conditions.

The Symposium could not have happened without the effort and dedication of many people who worked tirelessly on short notice. I am very grateful for their assistance, commitment, and dedication. This year the co-organizers of minisymposia and session moderators had an extensive task and a crucial role in the success of the Conference. The hard work of moderators, the Program Committee, the Organizing Committee, Communication Committee, and InterPore’s executive staff is greatly appreciated.

Thank you for participating in the Conference. Please enjoy the Conference, learn as much as you can, virtually meet and make friends, and take advantage of the clear view of the presentations from the comfort of your office or home.

“Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning.” (Albert Einstein).

On behalf of the executive committee,
Laura J. Pyrak-Nolte
President of InterPore
As a Chair of the Organizing Committee, and on behalf of the highly efficient team which worked on the organization, I wish to give you a warm welcome to this edition of the InterPore Annual Meeting. For the first time, the Annual Meeting this year has been organized in an online format due to the Corona outbreak. I hope very much that you, your relatives and friends did not suffer from the disease, and wish good health to all of you. Despite the new format, this major event of the InterPore Society offers the full spectrum of conference features. We expect over 700 participants from all over the world. You can present your results to a competent audience, have fruitful discussions on your and on other presentations, meet old friends and make new ones. Although this year’s conference will be virtual, new software communication tools enable intensive and productive discussions. The scientific program is customized to the different time zones, which are most suitable for the presenters. It has been an intensive effort organizing the event in the new format, and the involved team has done the best to enable it runs smoothly and to make it memorable for you. Welcome to InterPore 2020.

Oleg Iliev
Chair of the Organizing Committee

On behalf of the Program Committee, it is my pleasure to welcome you to the InterPore2020 online conference. We had originally prepared the program for the conference to take place in China. Block program, MS chairs, etc., were all arranged. However, due to the COVID-19 outbreak, the committee worked closely with the Executive and Organizing Committee to redesign the program for an online conference in a relatively short period of time. This is a new chapter in InterPore’s history, a combination of live and recorded scientific events around porous media science. This allows anyone from anywhere on this beautiful planet Earth to connect, enjoy, learn, and present, with minimum registration fee. We are proud of being part of this open science program! We hope you all enjoy this conference, and help us to improve for the future by providing your feedback.

The Program Committee welcomes its new members and says goodbye to those who have finished their service period. Rainer Helmig and I will step down as chairs of the Program Committee effective 1/Jan/2021. New chairs will bring new ideas and framework for sharing science and making network and friendship. We would like to thank all the scientific program committee members for their contributions in allowing us reach major milestones, including the development of coherent structured mini-symposia and subject-expert invited chairs for them.

The most valuable asset of InterPore is the network among all of us, which makes us stand strong in difficult times and share our happiness in joyful moments.

To our proud InterPore family, enjoy the best scientific event on porous media!

Hadi Hajibeysi
Co-Chair of the Program Committee

Oleg Iliev
Fraunhofer Institute

Hadi Hajibeysi
Delft University of Technology

Rainer Helmig
Stuttgart University
InterPore Foundation for Porous Media Science and Technology

The InterPore Foundation is a Non-profit, non-governmental, independent organization founded by the International Society for Porous Media in 2016. Our mission is to promote and support innovative research, support educational activities of Interpore society and finance awards for excellence and diversity in the broad field of porous media and for honoring distinguished talented researchers and lecturers.

The foundation also facilitates the participation of promising young scientists in international scientific gatherings hosted by InterPore, and supports outstanding young scientists from countries with financial difficulties to join InterPore activities.

During the past year, the newly-formed InterPore Foundation continued the expansion of its activities and securing funds for InterPore awards, prizes, and grants. This has been made possible by generous grants from Proctor & Gamble, Kimberly-Clark Inc., and PoreLab (Norway), as well as some individuals (where a notable donation was made by Rien van Genuchten). This year, InterPore Foundation provided 25 conference grants to students and young scientists. The Foundation aims to increase both the number and amount of these grants for the coming years. This will be possible with your help only.

Support our actions by making a donation to the Interpore Foundation through: https://www.interpore.org/foundation/foundation-donate

Your small contributions will have a huge impact on science!
THANKS TO OUR SPONSORS

PLATINUM

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ZEISS
THANKS TO OUR SPONSORS

GOLD

InterPore 2019 supporters:
VISIT OUR ONLINE EXHIBITORS
**LIST OF MINI SYMPOSIA**

(1) **Porous Media for a Green World: Energy & Climate**  
**Organizers:** Sarah Gasda, Sebastian Geiger, Bo Guo, Hadi Hajibeygi, Rainer Helmig

(2) **Porous Media for a Green World: Water & Agriculture**  
**Organizers:** Joaquin Jimenez-Martinez, Jun Yin, Jan Vanderborght, Pejman Tahmasebi, Salvatore Calabrese

(3) **Flow, transport and mechanics in fractured porous media**  
**Organizers:** Holger Steeb, Hamid Nick, Benoit Noetinger, Liu Jianjun

(4) **Swelling and shrinking porous media**  
**Organizers:** Jacques Huyghe, Abdolreza Kharaghani, Yihuai Zhang, Muhammad Sahimi, Jianchao Cai

(5) **Biochemical processes and biofilms in porous media**  
**Organizers:** Al Cunningham, Adie Phillips, Leon Van Paassen, Eleonora Secchi, Anozie Ebigbo

(6-A) **Physics of multi-phase flow in diverse porous media**  
**Organizers:** Aimi Bazylak, Steffen Berg, Yaniv Edery, Ryan Armstrong, Holger Ott

(6-B) **Interfacial phenomena in multiphase systems**  
**Organizers:** Grigori Chaparo, Yashar Mehmani, Hai Sun, Ke Xu, Bo Guo, Pacelli Zitha

(7) **Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes**  
**Organizers:** Sorin Pop, Ivan Yotov, Peng Xu

(8) **Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media**  
**Organizers:** Marco Dentz, Branko Bijeljic, Hossein Hejazi, Amir Raoof

(9) **Pore-scale modelling**  
**Organizers:** Martin Blunt, Stephane Zaleski, James McClure, Yongfei Yang

(10) **Advances in imaging porous media: techniques, software and case studies**  
**Organizers:** Liwei Zhang, Adrian Sheppard Matthiis de Winter, Nikolaos K. Karadimitriou

(11) **Microfluidics in porous systems**  
**Organizers:** Florian Doster, Hassan Mahani, Afshin Goharzadeh, Yves Méheust
LIST OF MINI SYMPOSIA

(MS 12) Advances in modeling and simulation of poromechanics
Organizers: Martin Vohralik, Daigang Wang

(MS 13) Fluids in Nanoporous Media
Organizers: Gennady Gor, Patrick Huber, Renyuan Sun

(MS 14) Uncertainty Quantification in Porous Media
Organizers: Shuyu Sun, Denis Voskov, Zhiwen Zhang, Liang Xue

(MS 15) Machine Learning and Big Data in Porous Media
Organizers: Kai Zhang, Bailian Chen, Jianchun Xu, Yalchin Efendiev

(MS 16) Fluid Interactions with Thin Porous Media
Organizers: Rui Wu, Hamed Aslannejad, Chaozhong Qin

(MS 17) Thermal Processes, Thermal Coupling and Thermal Properties of Porous Media: modeling and experiments at different scales
Organizers: Moran Wang, Bernhard Krooss, Yingfang Zhou, Ruina Xu

(MS 18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers
Organizers: Christos Tsakiroglou, Marios Valavanides, Olga Vizika, Qi Li

(MS 19) Electrochemical processes in porous media
Organizers: Ezequiel Medicil, Pablo A. García-Salaberry, Jeff Gostick, Iryna V. Zenyuk

(MS 20) Biophysics of living porous media: theory, experiment, modeling and characterization
Organizers: Fred Vermolen, Chi Zhang

(MS 21) Effective elastic, thermal, electrical and optical properties of porous materials, cellular materials, foams and metamaterials
Organizer: 

(MS 22) Catalysis and adsorption/absorption processes in porous media
Organizer: Oleg Oliev, Satoru Katoh, Huijin Xu

(MS 23) Special Session for Professor Rainer Helmig
Organizer: Wolfgang Ehlers, Bernd Flemisch
### Block A (CET)  
#### 09:00 – 09:30  
**Invited lecture 1:** Moran Wang  
**Chair:** Insa Neuweiler  
**Invited lecture 2:** Stephane Zaleski  
**Chair:** Bernhard Krooss  

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<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>09:00 – 09:30</td>
<td><strong>Invited lecture 1:</strong> Moran Wang</td>
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<tr>
<td>09:30 – 09:35</td>
<td><strong>Break</strong></td>
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<tr>
<td>09:35 – 10:35</td>
<td>Q&amp;A 1  MS 3  MS 7  MS 8</td>
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<tr>
<td>10:35 – 10:40</td>
<td>Break</td>
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<tr>
<td>10:40 – 11:40</td>
<td>Q&amp;A 2  MS 3  MS 7  MS 8</td>
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<td>11:40 – 12:00</td>
<td>Break</td>
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### Block B (CET)  
#### 13:30 – 13:40  
**Plenary Session 1**  
**Chair:** Oleg Illiev  

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<th>Time</th>
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<tr>
<td>13:30 – 13:40</td>
<td><strong>Opening Ceremony:</strong> Laura Pyrak-Nolte</td>
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<td>13:40 – 13:50</td>
<td><strong>Award Ceremony 1:</strong> Harry Vereecken, Honorary Lifetime Membership Award</td>
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<td>13:50 – 14:35</td>
<td><strong>Keynote Lecture 1:</strong> Aimy Bazylak</td>
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<td>14:35 – 14:40</td>
<td><strong>Plenary Pitch 1:</strong> Branko Bijeljic</td>
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<td>14:40 – 15:00</td>
<td>Break</td>
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<tr>
<td>15:00 – 15:55</td>
<td>Q&amp;A 3  MS 3  MS 7  MS 8</td>
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<td>15:55 – 16:00</td>
<td>Break</td>
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<tr>
<td>16:00 – 16:55</td>
<td>Q&amp;A 4  MS 3  MS 7  MS 11</td>
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### Block C (CET)  
#### 18:00 – 18:30  
**Invited lecture 3:** Olga Vizika  
**Chair:** Debasmita Misra  
**Invited lecture 4:** Muhammad Sahimi  
**Chair:** Masa Prodanovic  

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<th>Time</th>
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<tr>
<td>18:00 – 18:30</td>
<td><strong>Invited lecture 3:</strong> Olga Vizika</td>
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<td>18:30 – 18:45</td>
<td>Break</td>
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<tr>
<td>18:45 – 19:40</td>
<td>Q&amp;A 5  MS 3  MS 7  MS 8</td>
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<td>19:40 – 19:45</td>
<td>Break</td>
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<tr>
<td>19:45 – 20:40</td>
<td>Q&amp;A 6  MS 3  MS 6-A  MS 11</td>
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<td>Time</td>
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| 09:00 – 09:10| Plenary Session 2 [Chair: Nima Shokri]  
Award Ceremony 2: *Amir Raoof*, Procter & Gamble Award for Thin and Swelling Porous Media Research  
*Tanguy le Borgne*, InterPore Award for Excellence in Porous Media Research | Invited lecture 5: Bernd Flemisch  
Chair: Matteo Icardio  
Invited lecture 6: Lilit Yeghiazarian  
Chair: Sebastian Geiger |  |
| 09:10 – 09:55| Plenary Pitch 2: Sebastian Geiger  
Keynote Lecture 2: Signe Kjelstrup | Break |  |
| 09:55 – 10:00| Plenary Pitch 2: Sebastian Geiger  
Keynote Lecture 2: Signe Kjelstrup | Break |  |
| 10:00 – 10:05| Break | Break |  |
| 10:05 – 11:00| Q&A 7 MS 1 MS 13 MS 17 | Q&A 9 MS 1 MS 13 MS 14 | Q&A 11 MS 1 MS 13 MS 18  
Scientific Writing Seminar |
| 11:00 – 11:05| Break | Break |  |
| 11:05 – 12:00| Q&A 8 MS 1 MS 13 MS 6-A | Q&A 10 MS 1 MS 13 MS 18 | Q&A 12 MS 1 MS 4 MS 17 |
| 14:00 – 14:30|  |  |  |
| 14:30 – 14:35|  | Break |  |
| 14:35 – 15:30| Q&A 9 MS 1 MS 13 MS 14 | Break |  |
| 15:30 – 15:35| Break | Break |  |
| 15:35 – 16:30| Q&A 10 MS 1 MS 13 MS 18 | Break |  |
| 16:30 – 17:00| Break | Break |  |
| 17:00 – 18:00| Career Development Event (Student Affairs Committee activity) |  |  |
| 18:00 – 18:55| Q&A 11 MS 1 MS 13 MS 18 | Q&A 11 MS 1 MS 13 MS 18  
Scientific Writing Seminar |  |
| 18:55 – 19:00| Break | Break |  |
| 19:00 – 19:55| Q&A 12 MS 1 MS 4 MS 17 | Break |  |
| 19:55 – 20:00| Break | Break |  |
| 20:00 – 20:55| Q&A 13 MS 6-A MS 23 MS 14 |  |  |
| Block A (CET) | 09:00 – 09:30 | Invited lecture 7: Fred Vermolen  
Chair: Olaf Kolditz | Invited lecture 8: Martin Vohralik  
Chair: William Rossen |
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<td>09:30 – 09:35</td>
<td>Break</td>
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<td>09:35 – 10:30</td>
<td>Q&amp;A 14  MS 6-A  MS 2  MS 12</td>
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<td>10:30 – 10:35</td>
<td>Break</td>
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<td>10:35 – 11:30</td>
<td>Q&amp;A 15  MS 6-A  MS 15  MS 10</td>
<td>Scientific Writing Seminar</td>
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| Block B (CET) | 14:00 – 14:30  | Invited lecture 9: James McClure  
Chair: Cyprien Soulaine | Invited lecture 10: Guang Yang  
Chair: Samuel Jackson |
|              | 14:30 – 14:35  | Break                           |                                 |
|              | 14:35 – 15:30  | Q&A 16  MS 6-A  MS 5  MS 10    |                                 |
|              | 15:30 – 15:35  | Break                           |                                 |
|              | 15:35 – 16:30  | Q&A 17  MS 6-A  MS 15  MS 23  |                                 |
|              | 16:30 – 16:35  | Break                           |                                 |
|              | 16:35 – 17:00  | Company Representatives Available for Interactions & Pitch |
|              |                | • Hiden Isochema                 | • Thermo Fisher Scientific      |
|              |                | • COMSOL, INC                     | ElectroN Microscopy Solutions   |
|              |                | • Energies                        | • Thermo Fisher Scientific      |
|              |                | • Math2Market                      | Software Solutions              |
|              |                | • Nuimag – Low Field NMP           | • Zeiss                         |
| Block C (CET) | 18:00 – 18:10  | Plenary Session 3 [Chair: Alberto Guadagnini]  
Award Ceremony 3: Muhammad Sahimi  
Kimberly-Clark Distinguished Lectureship Award  |
|              | 18:10 – 18:55  | Keynote lecture 3: Qinjun Kang    |                                 |
|              | 19:00 – 19:05  | Break                           |                                 |
|              | 19:05 – 20:00  | Q&A 18  MS 9  MS 6-B  MS 12     |                                 |
|              | 20:00 – 20:05  | Break                           |                                 |
|              | 20:05 – 21:00  | Q&A 19  MS 9  MS 15  MS 10     |                                 |
## THURSDAY, 3 SEPTEMBER 2020

<table>
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<tr>
<th>Time</th>
<th>Block A (CET)</th>
<th>Block B (CET)</th>
<th>Block C (CET)</th>
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<tbody>
<tr>
<td>09:00 – 09:55</td>
<td><strong>Q&amp;A 20</strong> MS 9 MS 6-B MS 10</td>
<td><strong>Q&amp;A 23</strong> MS 9 MS 6-B MS 19</td>
<td><strong>Plenary Session 4</strong> [Chair: Laura Pyrak-Nolte] <strong>Award Ceremony 4</strong>: Hamad Aslannejad, InterPore – PoreLab Award for Young Researchers Basant Yadav, Rien van Genuchten Early-Career Award of Porous Media for a Green World InterPore Rosette Awardees</td>
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<td>09:55 – 10:00</td>
<td><strong>Break</strong></td>
<td><strong>Break</strong></td>
<td><strong>Keynote lecture 4</strong>: Dominik Obrist</td>
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<td>10:00 – 10:55</td>
<td><strong>Q&amp;A 21</strong> MS 9 MS 20</td>
<td><strong>Q&amp;A 24</strong> MS 9 MS 6-B MS 22</td>
<td><strong>Closing Ceremony: LOC Chair</strong></td>
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<td>10:55 – 11:00</td>
<td><strong>Break</strong></td>
<td><strong>Break</strong></td>
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<td>11:00 – 11:55</td>
<td><strong>Q&amp;A 22</strong> MS 9 MS 19</td>
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<td><strong>Break</strong></td>
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<tr>
<td>14:00 – 14:55</td>
<td><strong>Q&amp;A 23</strong> MS 9 MS 21 &amp; MS 16 MS 19</td>
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<td>14:55 – 15:00</td>
<td><strong>Break</strong></td>
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<td>15:00 – 15:55</td>
<td><strong>Q&amp;A 24</strong> MS 9 MS 6-B MS 22</td>
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<tr>
<td>15:55 – 16:00</td>
<td><strong>Break</strong></td>
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<tr>
<td>16:00 – 16:55</td>
<td><strong>Q&amp;A 25</strong> MS 9</td>
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<td><strong>Social Event</strong>: Jaime’s Interactive Magic Show</td>
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PROGRAM HIGHLIGHTS

Invited Lectures
Monday, Time Block A - 09:00 - 09:30 CET

Opening Ceremony
Monday, Time Block B - 13:30 - 13:40 CET

Award Ceremony: Honorary Lifetime Membership Award
Monday, Time Block B - 13:40 - 13:50 CET

Keynote Lecture: Aimy Bazylak
Monday, Time Block B - 13:50 - 14:35 CET

Plenary Pitch
Monday, Time Block B - 14:35 - 14:40 CET

Invited Lecturers
Monday, Time Block C - 18:00 - 18:30 CET

Award Ceremony: Procter & Gamble Award for Thin and Swelling Porous Media Research and InterPore Award for Excellence in Porous Media Research
Tuesday, Time Block A - 9:00 - 9:10 CET

Keynote Lecture: Signe Kjelstrup
Tuesday, Time Block A - 9:10 - 9:55 CET

Plenary Pitch
Tuesday, Time Block A - 9:55 - 10:00 CET

Invited Lectures
Tuesday, Time Block B - 14:00 - 14:30 CET

Career Development Event
Tuesday, Time Block B - 17:00 - 18:00 CET

Scientific Writing Seminar
Tuesday, Time Block C - 18:00 - 19:00 CET

Invited Lectures
Wednesday, Time Block A - 9:00 - 9:30 CET

Scientific Writing Seminar
Wednesday, Time Block A - 10:30 - 11:30 CET
PROGRAM HIGHLIGHTS

Invited Lectures
Wednesday, Time Block B - 14:00 - 14:30 CET

Company Pitches
Wednesday, Time Block B - 16:35 - 17:00 CET

Award Ceremony: Kimberly-Clark Distinguished Lectureship Award
Wednesday, Time Block C - 18:00 - 18:10 CET

Keynote Lecture: Qinjun Kang
Wednesday, Time Block C - 18:10 - 18:55 CET

Interactive magic show: What you did not know about the porosity of cards
Thursday, Time Block C - 17:30 - 17:55 CET

Award Ceremony: InterPore-PoreLab Award for Young Researchers and Rien van Genuchten Early-Career Award of Porous Media for a Green World
Thursday, Time Block C - 18:00 - 18:10 CET

Keynote Lecture: Dominik Obrist
Thursday, Time Block C - 18:10 - 18:55 CET

Closing Ceremony
Thursday, Time Block C - 18:55 - 19:10 CET
In response to the excellent participation in the previous years, the Student Affairs Committee (SAC) will organize a set of activities during the 2020 InterPore virtual meeting. The SAC activities are free and open to participants from all career stages, from the early student to the experienced researcher/professor. They form the perfect setting for you to get to know the international porous media community better and expand your professional and personal network. Come along!

More information on both of these events can be found in the detailed program.

InterPore SAC 2020 Board Members

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University of Oslo, Norway

Vice-Chair
Olav Galteland
Norwegian University of Science and Technology, Norway

Events Manager and Financial Advisor
Neerja Zambare
Montana State University, USA

Secretary and Communication Advisor
Seunghan Song
Norwegian University of Science and Technology, Norway

Events Director
Marco Sauermoser
Norwegian University of Science and Technology, Norway

Communication Officer
Mohammad Nooraiepour
University of Oslo, Norway

Communication Officer
Cunqi Jia
University of Petroleum, China

Would you like to join SAC and make InterPore 2020 even better? Contact sac@interpore.org
STUDENT AFFAIRS EVENTS

Career Development Event
*Tuesday, Time Block B - 17:00 - 18:00 CET*

One of the most common struggles for a PhD student is to decide which career path to follow after graduate school. There are numerous opportunities that are potentially open to us as PhDs, which can take us on very different career paths. There are likely many questions you have about picking a direction (industry/academia/government) and the pros and cons of the various possibilities. A good approach to making an informed decision is listening to experiences and personal views of established professionals. The SAC’s career event will have speakers from varied backgrounds, sharing their professional journeys and the important choices they had to make along the way. You will also have the chance to ask the speakers any questions you have!

Scientific Writing Seminar
*Tuesday, Time Block C - 18:00 - 19:00 CET or Wednesday, Time Block A - 10:30 - 11:30 CET*

**How to write a successful research paper: The 10 mistakes to avoid**

Jaime Gómez-Hernández will be offering this writing workshop, which is free and open to all participants of InterPore2020. Through a number of real cases, the attendants will learn the common mistakes made when submitting a manuscript for consideration to a specialized journal.

Jaime has served in the Editorial Boards of Journal of Hydrology, Journal of Hydrogeology and Mathematical Geology for many years, and currently, he is still a member of the boards of Advances in Water Resources, Mathematical Geosciences, Water, and Springer Nature Applied Science. He has rejected too many manuscripts in the last 20 years and can tell you what to do to avoid rejection. He will also discuss how to deal with non-scientific reviews, and what to do when you know that the review is incorrect.

Everything will be presented using examples based on actual submissions in a very casual and lively way. Many previous attendants to this seminar have been able to overcome the hurdle of the dreaded rejection letter.

This event will be held twice for your convenience!
Moran Wang
Tsinghua University

Electrokinetic and ion transport in micro/nanoporous media

Ion transport is ubiquitous in aqueous environments in biological, geological, chemical and environmental systems. Electrokinetics plays a very important and key role in some special cases where pore size is comparable to the screening length of electrical double layer. The applications include tight oil/gas exploration and development, radiative waste disposal, high-quality water purification, and even ion channels in cells. This talk will present (1) electrokinetic and interface theories for ion transport in micro/nanoporous media; (2) a mesoscopic numerical framework for predictions and the validations by comparisons with theories and experimental data; (3) multiscale analysis in both spacial and temporal scales for special applications.
Stéphane Zaleski
Sorbonne Université

Contact line motion using the Volume of Fluid method

Wettability, contact line dynamics and surface tension are essential in the pore scale motion of interfaces. Since it is difficult to resolve numerically the small interface thickness a sharp interface model seems the only practical solution. However in the context of this sharp interface model Huh and Scriven wrote “not even Herakles could sink a solid if the physical model were entirely valid”. The resolution of this paradox has occupied a large number of investigators, however a popular fix is to assume a Navier boundary condition for the tangential fluid velocity on the solid surface, which introduces a slip length $l$. We discuss the performance of such slip length models in various regimes. The sharp interface model is implemented using a Volume Of Fluid (VOF) method in the context of several free codes developed at d’Alembert Institute of Sorbonne Université and the FLOW lab at KTH. The results are compared to experiments and molecular dynamic simulations.
Monday, 31 August 2020

Timing of Q&A sessions on Monday

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<th>Time Block (CET)</th>
<th>Q&amp;A No.</th>
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<th>Parallel sessions 2</th>
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<td>A (09:35 – 10:35)</td>
<td>Q&amp;A 1</td>
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<td>MS7, part1</td>
<td>MS8, part1</td>
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<td>A (10:40 – 11:40)</td>
<td>Q&amp;A 2</td>
<td>MS3, part2</td>
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<td>MS3, part3</td>
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<td>Q&amp;A 5</td>
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<td>C (19:45 – 20:40)</td>
<td>Q&amp;A 6</td>
<td>MS3, part6</td>
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Question and answer: Parallel sessions 1

( MS 3) Flow, transport and mechanics in fractured porous media – Part 1

**Q&A 1 09:35 - 10:35 - Chairs: Holger Steeb, Hamid Nick, Benoit Noetinger**

[614] Study on water injection mechanism of tight reservoir based on large-scale outcrop physical simulation experiment

*Yutian Luo; Xuewei Liu*

[286] Oxidative dissolution during spontaneous imbibition in organic-rich shale: implication for the matrix stimulation

*Qiuyang Cheng; Lijun You; Yili Kang; Yang Zhou; Nan Zhang*

[515] The Influence of Fractures on the Enrichment of Tight Sandstone Gas

*Ping Wang; Quanyou Song; Baogang Li; Wenqing Tang; Jin Wang*

[84] Flow Law of Foam in Fractured Vuggy Reservoir

*Zhengxiao Xu; Zhaomin Li; Binfei Li; Longkun Chen; Danqi Chen; Zihan Gu*

[741] Analysis of Factors Affecting Fracturing and Absorbing Parameters in Tight Reservoir

*Zhu Jiamin; Wu Minglu; Chen Xianchao*

[756] Analysis of Hydrate Seafloor Subsidence Induced by Depressurization in Nankai Trough, Japan

*Shuyue Ding; Shuxia Li; Didi Wu; Shaung Li*

[363] The influence of microfractures on hydrocarbon migration

*Wenqing Tang; Taixun Liu; Xiangying Wang; Jin Wang; Ping Wang*

[252] A physics based model of gas flow in shales predicts enhanced gas production

*Syed Haider; Tadeusz Patzek*
### (MS 3) Flow, transport and mechanics in fractured porous media – Part 2

#### Q&A 2 10:40 – 11:40 - Chairs: Holger Steeb, Hamid Nick, Benoit Noetinger

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<th>Paper Number</th>
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<tr>
<td>[360]</td>
<td>Combined effects of network topology, hydraulic conditions and in-situ stress variations on solute propagation in natural fracture networks</td>
<td>Chuanyin Jiang; Xiaoguang Wang; Delphine Roubinet; Zhixue Sun</td>
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<tr>
<td>[50]</td>
<td>Pipe Network Modelling for Fractured Rock Cores with Micro-computed Tomography Imaging</td>
<td>YU JING; Ryan Armstrong; Peyman Mostaghimi</td>
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<td>[1307]</td>
<td>The hydraulic conductivity of shaped fractures with permeable walls</td>
<td>Daihui Lu; Federico Municchi; Ivan Christov</td>
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<td>[120]</td>
<td>A systematic investigation of the intrinsic flow properties of fractures using a combined 3D printing and micro-computed tomography approach</td>
<td>Tomos Phillips; Tom Bultreys; Arjen Mascini; Nathaniel Forbes Inskip; Sabine den Hartog; Niko Kampman; Kevin Bisdom; Veerle Cnudde; Andreas Busch</td>
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<td>[48]</td>
<td>Identification of Fracture Properties in Shale Oil Reservoirs by a Well Testing Model with “Fracturing-shutting” : A Case Study</td>
<td>Lumin Shi; Zhiheng Chen; Xiaoliang Zhao</td>
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<td>[63]</td>
<td>Sensitivity Analysis on Different Parameters Affecting the Gas-Oil Gravity Drainage Mechanism in Naturally Fractured Reservoirs</td>
<td>Mohammad Madani; Amin Daryasafar</td>
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<td>[927]</td>
<td>Capillarity vs. Saturation in Fracture-Matrix Systems</td>
<td>Qi Liu; Alejandro Cardona; Juan Carlos Santamarina</td>
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<td>[625]</td>
<td>A multilayer model for reactive flow in fractured porous media</td>
<td>Alessio Fumagalli; Anna Scotti; Luca Formaggia</td>
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### (MS 3) Flow, transport and mechanics in fractured porous media – Part 3

#### Q&A 3 15:00 – 15:55 - Chairs: Holger Steeb, Hamid Nick, Benoit Noetinger

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<th>Paper Number</th>
<th>Title</th>
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<tr>
<td>[326]</td>
<td>Adaptive Virtual Element Method for simulations of flow in fractured media</td>
<td>Andrea Borio; Stefano Berrone; Alessandro D’Auria</td>
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<td>[1323]</td>
<td>Multiscale model reduction of unsaturated flow problem</td>
<td>Denis Spiridonov; Maria Vasilyeva; Eric T. Chung; Yalchin Efendiev</td>
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<td>[674]</td>
<td>Implicit multiscale modelling for stress-dependent permeability in a poroelastic dual-continuum setting</td>
<td>Mark Ashworth, Florian Doster; Christine Maier</td>
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<tr>
<td>[683]</td>
<td>The impact of fracture surface roughness on stress dependent permeability</td>
<td>Amanzhol Kubeyev; Christine Maier; Niko Kampman; Kevin Bisdom; Rafael March Castaneda Neto; Florian Doster</td>
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<tr>
<td>[443]</td>
<td>Topological analysis of 3D Discrete Fracture Networks: a graph approach to connectivity and percolation in fractured rocks</td>
<td>Tawfik Rajeh; Israel Canamon; Rachid Ababou; Manuel Marcoux</td>
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<td>[313]</td>
<td>Measuring the deformation of porous media in response to hydraulic pressure</td>
<td>Martin Stolar; Yaniv Edery; Tajudeen M. Iwalewa; James R. Rice</td>
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Question and answer: Parallel sessions 1 (cont.)

(MS 3) Flow, transport and mechanics in fractured porous media – Part 3 (cont.)

Q&A 3 15:00 – 15:55 - Chairs: Holger Steeb, Hamid Nick, Benoit Noetinger

[1149] Bandwidth re-fracturing technique optimization and design consideration in naturally-fractured tight reservoirs --- Case study on Anai oil field, Ordos basin
Xia Du, Mr Yu Liang Su; Wendong Wang; Ning Zhao Dongsheng Li

Anna Suzuki; Miyuki Miyazawa; Takatoshi Ito; Peter Kang

Q&A 4 16:00 – 16:55 - Chairs: Holger Steeb, Hamid Nick, Benoit Noetinger

(MS 3) Flow, transport and mechanics in fractured porous media – Part 4

[919] Understanding Hydraulic Fracturing Dynamic Stimulation: Dynamic Characterization and Design Considerations for Tight Porous Media
Abhijith Suboyin; MD Motiur Rahman; Mohammed Haroun

[320] Fracture pore network model: efficient pore scale modelling of fluid flow in fractured porous media
Chenhui Wang; Kejian Wu; Gilbert Scott

[461] A comparative study of Lattice Boltzmann models for complex fractal geometry
Dong Zhang; Xiang Zhao Kong; Enzhi Wang

[256] Laser-Induced Fluorescence (LIF) study of solute transport in 3D-printed fractured porous media
Mehrdad Ahkami; Xiang Zhao Kong; Martin O. Saar

[354] An investigation into the controls of fracture tortuosity in rock sequences and its impact on fluid flow in the upper crust
Nathaniel Forbes Inskip; Tomos Phillips; Kevin Bisdom; Georgy Borisovitch; Andreas Busch; Sabine den Hartog

[1032] Experimental study of contaminant transport in coupled fracture-porous medium systems
Monika S. Walczak; Hamidreza Erfani Gahrooei; Nikolaos Karadimitriou; Ioannis Zarikos; S. Majid Hassanizadeh; Vahid J. Niasar

[1274] Gas-Oil Displacement Mechanisms in Fractured Vuggy Carbonates at Immiscible and Miscible Conditions
Xiongyu Chen; Kishore Mohanty

[1249] Effect of Fracture on Reactive-Density-Driven Convection of Injected CO2 in Porous Reservoir
Paiman Shafabakhsh; Behzad Ate-Astiani; Craig T. Simmons; Marwan Fahs
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### (MS 3) Flow, transport and mechanics in fractured porous media – Part 5

#### Q&A 5 18:45 – 19:40 - Chairs: Holger Steeb, Hamid Nick, Benoit Noetinger

1. **A three-field approach for flow simulations in networks of fractures on non conforming meshes**
   - Stefano Berrone; Sandra Pieraccini; Stefano Scialò; Denise Grappein

2. **Extended finite element analysis of a coupled fracture-reservoir model**
   - Elisa Bergkamp; Clemens Verhoosel; Joris Remmers; David Smeulders

   - Mousa HosseiniMehr; Cornelis Vuik; Hadi Hajibeygi

4. **Recent advances in Mixed Virtual Elements for DFM simulations**
   - Matias Benedetto; Andrea Borio; Franco Dassi; Alessio Fumagalli; Davide Losapio; Anna Scotti; Stefano Scialò; Giuseppe Vacca

5. **Fluid flow through anisotropic and deformable double porosity media with ultra-low matrix permeability: An efficient continuum framework**
   - Qi Zhang; Ronaldo Borja

6. **Fracture-matrix interactions implicated by matrix pore connectivity: From waste repository to shale hydrocarbon production**
   - Qinhong Hu

7. **Numerical Simulation of Fault Slip in Shale Gas Reservoirs Based on Discrete Fracture Network Model**
   - Hao Liu; Zhaqin Huang; Qinghua Lei

8. **Fracture propagation in porous media during fluid injection**
   - Srutarshi Pradhan

### (MS 3) Flow, transport and mechanics in fractured porous media – Part 6


9. **Investigations of pore connectivities and permeabilities of fractured vuggy carbonates based on digital rock techniques**
   - Weichao Yan; Sun Jianmeng

10. **Experimental Study on Two-phase Miscible Displacement Pattern of Porous Media**
    - Wei Guo; Ran Hu

11. **Study on Water Quality Sensitivity and Characterization of Permeability in Water Flooding Sandstone Reservoirs**
    - Xiankun Song; Jianzhong Wang

12. **Experimental investigation of low salinity water flooding efficiency in tight carbonate fractured oil reservoirs; a case study**
    - Rasoul Mokhtari; Mohammad Sadegh Mousapour; Pourya Malmir; Amin Alinejad; Shahab Ayatollahi

13. **Impact of fracture sealing on the percolation state of orthogonal fracture networks**
    - Weiwei Zhu; Siarhei Khirevich; Tadeusz Patzek
### Question and answer: Parallel sessions 1 (cont.)

**Q&A 6** 19:45 – 20:40 - **Chairs:** Holger Steeb, Hamid Nick, Benoit Noetinger

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<tr>
<th>Paper ID</th>
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<th>Authors</th>
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<tr>
<td>[145]</td>
<td>Pore structure characteristics of the Paleogene Shahejie Shale Oil Formation in Dongying Sag, Bohai Bay Basin, China</td>
<td>Xiuchuan Zhu; Qinhong Hu; Mianmo Meng; Na Yin; Binyu Ma; Yushan Du; Jing Chao</td>
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<tr>
<td>[1252]</td>
<td>Role of mineralogy in controlling fracture formation.</td>
<td>Olivia Brunhoeber; Lauren Beckingham</td>
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<td>[379]</td>
<td>A Novel Correction Method of Ergun Equation for Application in a Rectangular Channel Partially Filled with Porous Media.</td>
<td>Tianwang Lai; Xiangyang Liu; Sa Xue; Maogang He; Jiming Xu</td>
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### Question and answer: Parallel sessions 2

**Q&A 1** 09:35 – 10:35 - **Chairs:** Sorin Pop, Peng Xu, Carina Bringedal

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<th>Paper ID</th>
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<tr>
<td>[1306]</td>
<td>A Numerical Study on Multiphysics Fluid Flow in a Shale Gas Reservoir with Non-Uniform Fractures</td>
<td>Abhishek Kumar; Suresh Kumar Govindarajan</td>
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<tr>
<td>[1207]</td>
<td>Spectral time-dependent solutions for natural convection in porous enclosure</td>
<td>Amin Fahs; Ali Zakeri; Adrien Wanko</td>
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<td>[30]</td>
<td>Research and Application of Numerical Method of Evaluation of Fracturing Effects in Large Scale Volume Reform of Vertical Wells</td>
<td>Debin Xia; Zhengming Yang; Xinlin Zhao Wei Lin; Ting Chen; Luo Yapu Zhang; Anshun Zhang</td>
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<td>[658]</td>
<td>An Embedded Discrete Fracture Method Based Well-Test Model for Pressure Transient Analysis in Fractured Wells with Complex Fracture Networks</td>
<td>Hui Liu; Xinwei Liao; Xiaoliang Zhao; Lijia Yuan; Juan Zhao</td>
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<td>[716]</td>
<td>A Discrete Fracture-Matrix Model for Pressure Transient Analysis in Multistage Fractured Horizontal Wells with Arbitrarily Distributed Natural Fractures</td>
<td>Hui Liu; Xinwei Liao; Xuefeng Tang; Xiaoliang Zhao; Lijia Yuan; Juan Zhao</td>
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<td>[1297]</td>
<td>A multi-scale nonlinear finite element modelling of subsurface energy storage under cyclic loading</td>
<td>Kishan Ramesh Kumar; Hadi Hajibeygi</td>
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<td>[918]</td>
<td>A new parallel framework for general purpose reservoir simulation with advanced discretization and linearization schemes</td>
<td>Longlong Li; Ahmad Abushaikha</td>
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<tr>
<td>[1161]</td>
<td>Simulation of two-phase flow in fractured media with discontinuous capillary pressure</td>
<td>Luat Khoa Tran; Stephan Matthai</td>
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Question and answer: Parallel sessions 2 (cont.)

(MS 7) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes– Part 2

Q&A 2 10:40 – 11:40 - Chairs: Jaime Gomez-Hernandez, Carina Bringedal, Sorin Pop

[530] A feasible method for the construction of fixed-tortuosity capillary medium with self-similarity behavior
Wei Wei; Jianchao Cai; Yuxuan Xia Dr Haitao Tian; Zhenhua Tian

[241] A revisited compositional 2-phase flow model for gas transport at various scales in heterogeneous porous structures in a deep geological radioactive waste disposal facility
Zakaria Saadi; Abdellah Amir; Rachid Ababou

[102] A (real) multi-scale solver for two-phase flow: a micro-continuum approach
Cyprien Soulaine; Francisco Carrillo; Ian Bourg

[1291] Coupling conditions for Stokes-Darcy problems with arbitrary flow directions
Elissa Eggenweiler; Iryna Rybak

[1192] Generation of a micro-earthquake clouds induced by the arrival of nonlinear fronts of pressure and temperature
Arrigo Caserta; Roman Kanivetsky; Ettore Salust

Lars von Wolff; Iuliu Sorin Pop

[641] Study on the coupling mathematical model of gas-water two-phase seepage and wellbore pipe flow in fractured horizontal Wells in volcanic gas reservoirs
Cheng Fu; Abdellah Amir; Rachid Ababou

[695] Gravity Segregation in Foam Mobility Control in Heterogeneous Reservoir
Xiaocong Lyu; Denis Voskov; William Rossen

(MS 7) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes– Part 3

Q&A 3 15:00 – 15:55 - Chairs: Sorin Pop, Peng Xu, Carina Bringedal

[1190] Production Enhanced Potential Evaluation and Integrated Design for Horizontal Wells Energized Fracturing --- Case Study on Chang 7 Tight Reservoir, Ordos Basin
Guanqun Li; Yuliang Su; Wendong Wang; Xia Du

[1333] Residual-driven online Generalized Multiscale Finite Element Method for the poroelasticity problem in fractured and heterogeneous media
Aleksei Tyrylgin; Maria Vasilyeva; Eric T. Chung; Yalchin Efendiev

[439] Multiscale Pore Network Integration Using the Poreflow Software
Elizabeth May Pontedeiro; William Godoy; Marianna Dantas; Fernanda Hoerlle; Martinus Th. van Genuchten; Amir Raoof; Paulo Couto

[1319] Nonlocal nonlinear upscaling for problems in heterogeneous and fracture media using machine learning technique
Maria Vasilyeva; Eric Chung; Yalchin Efendiev; Tat Leung Wing
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Question and answer: Parallel sessions 2 (cont.)

(MS 7) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes– Part 3 (cont.)

**Q&A 3 15:00 – 15:55 - Chairs: Sorin Pop, Peng Xu, Carina Bringedal**

  Martin Schneider; Edward Coltman; Kilian Weishaupt; Rainer Helmig

- [1280] Multiphase mixture models with phase change and filtration in OpenFOAM®  
  Federico Municchi; Matteo Icardi

- [665] A Bundle of Capillary Tubes (BOCT) Model for Carbonated Water Flooding (CWF); a Promising Technique for Simultaneous CO2 Storage and Enhanced Oil Recovery Purposes  
  Puyan Bakhshi; M. Mercedes Maroto-Valer; Mohammad Amani

- [287] Equivalent Conductivity Tensor in 3D Anisotropic Heterogeneous Formations  
  Qinzhuo Liao; Gang Lei; Dongxiao Zhang; Shirish Patil

(MS 7) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes– Part 4

**Q&A 4 16:00 – 16:55 - Chairs: Sorin Pop, Peng Xu, Carina Bringedal**

- [1316] A multi-step Dirichlet-Neumann domain decomposition method applied to the polymer injection in porous media  
  Renatha Batista dos Santos; Rodrigo Silva Tavares; Sidarta Araújo Lima; Adriano Santos

  Shuyu Sun; Huangxin Chen

  Stephan Gärttner; Peter Frolkovic; Peter Knabner; Nadja Ray

- [324] Incremental petrophysical characterization of carbonate rocks using μCT box counting fractal analysis for upscaling purposes  
  Tatiana Lipovetsky; Luca Moriconi; Behzad Ghanbarian

- [1320] Modeling and design optimization for pleated membrane filter  
  Yixuan Sun; Pejman Sanaei; Lou Kondic; Linda Cummings

- [1324] Stochastic Modelling of Adsorption and Sieving in a Pore Network  
  Binan Gu; Pejman Sanaei; Linda Cummings; Lou Kondic

- [352] A pore-network model approach for coupling free flow with porous medium flow applied to evaporation  
  Kilian Weishaupt; Rainer Helmig

- [33] Multi-scale iterative scheme for a phase-field model for reactive transport problems  
  Manuela Bastidas; Carina Bringedal Iuliu; Sorin Pop
**MONDAY, 31 AUGUST 2020**

**Question and answer: Parallel sessions 2 (cont.)**

**(MS 7) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes– Part 5**

**Q&A 5 18:45 – 19:40 - Chairs: Sorin Pop, Peng Xu, Carina Bringedal**

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<th>[1178] An accelerated staggered solution scheme to phase-field modeling of brittle fracture</th>
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<td>Erlend Storvik; Jakub Both; Juan Michael Sargado; Jan Martin Nordbotten; Florin Adrian Radu</td>
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<tr>
<th>[1144] Proactive Optimization of CO2 Sequestration under Geomechanical Constraints</th>
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<td>Mohammad Salehian; Aliakabar Hassanpouryouzband</td>
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<tr>
<th>[585] Computational Multiscale Methods for Linear Poroelasticity using CEM-GMsFEM</th>
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<td>Eric Chung; Sai-Mang Pun; Shubin Fu; Robert Altmann; Roland Maier; Daniel Peterseim</td>
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<tr>
<td>Michael Mont-Eton; David Mays</td>
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<th>[1180] Multiscale computation of pore-scale geomechanics</th>
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<td>Yashar Mehmani; Nicola Castelletto; Hamdi Tchelepi</td>
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<tr>
<th>[460] Stochastic and upscaled analytical modeling of fines migration in porous media induced by low-salinity water injection</th>
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<td>Yulong Yang; Weifeng Yuan; Jirui Hou; Zhenjiang You; Jun Li</td>
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<tr>
<th>[1328] Integration Pulse Decay Experimental Data into A Novel Continuum-Scale Multi-Physics Model to Study Gas Transport in Shale Formations</th>
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<tr>
<td>Zihao Li; Yuntian Teng Ming Fan; Cheng Chen;</td>
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<tr>
<td>Johan Phan; Leo Ruspini; Paal Eric Oeren; Frank Lindseth</td>
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**(MS 6-A) Physics of multi-phase flow in diverse porous media– Part 1**

**Q&A 6 19:45 – 20:40 - Chairs: Aimy Bazylak, Saman Aryana**

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<th>[1331] Nanoscale contact angle characterization of a water/oil/calcite system using atomic force microscopy.</th>
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<td>George Savulescu; Maja Ruecker; Alessio Scanziani; Apostolos Georgiadis; Paul F Luckham</td>
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<tr>
<th>[865] Pore scale simulations of two-phase flow in porous media with high permeability.</th>
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<tr>
<td>Maxime Cochenneec; Hossein Davarzani; Yohan Davit; Stéfan Colombano; Ioannis Ignatiadis; Michel Quintard</td>
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<thead>
<tr>
<th>[987] LBM simulations of graded Gas Diffusion Layer for PEMFC applications</th>
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<tr>
<td>Graham Danny Koyeerath; Yann Favennec; Christophe Josset; Bruno Auvity</td>
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<tr>
<th>[1265] Assessment of end-effects during two-phase flow in micro-fluidic model pore networks – is it possible?</th>
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<tr>
<td>Marios Valavanides; Nikolaos Karadimitriou; Holger Steeb</td>
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### Question and answer: Parallel sessions 2 (cont.)

**Q&A 6 19:45 – 20:40 - Chairs: Aimy Bazylak, Saman Aryana**

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<thead>
<tr>
<th>Paper Number</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>[1255]</td>
<td>In-situ Capillary Pressure Measurements for Gaining Insight into Foam Flow in Porous Media</td>
<td>Eric Vavra; Maura Puerto; George Hirasaki; Sibani Lisa Biswal</td>
</tr>
<tr>
<td>[966]</td>
<td>Core flood-on-a-chip: a study of viscoelasticity’s effects on oil recovery using a foot-long micromodel</td>
<td>Yujing Du; Matthew Balhoff</td>
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<tr>
<td>[1237]</td>
<td>Quantification of non-linear multiphase flow in porous media</td>
<td>Yihuai Zhang; Branko Bijeljic; Ying Gao; Qingyang Lin; Martin Blunt</td>
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<tr>
<td>[464]</td>
<td>Study of the residual saturation in NAPL in soils polluted by petroleum hydrocarbons in the groundwater runoff zone.</td>
<td>Elhadji Malick Niang; Manuel Marcoux</td>
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### Question and answer: Parallel sessions 3

**Q&A 1 09:35 – 10:35 - Chairs: Marco Dentz, Branko Bijeljic**

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<th>Paper Number</th>
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<tbody>
<tr>
<td>[195]</td>
<td>Permeability of salt crusts from evaporation of sand columns.</td>
<td>Joseph Piotrowski; Johan Alexander (Sander) Huisman; Andreas Pohlmeier; Uri Nachshon; Harry Vereecken</td>
</tr>
<tr>
<td>[49]</td>
<td>Quantitative Tortuosity Measurements of Carbonate Rocks using Pulsed Field Gradient NMR.</td>
<td>Kaishuo Yang; Ming Li; Nicholas N. A. Ling; Eric F. May; Paul R. J. Connolly; Lionel Esteban; Michael B. Clennell; Mohamed Mahmoud; Ammar El-Hussein; Abdulrauf R. Adebayo; Mahmoud Mohamed Elsayed; Michael L. Johns</td>
</tr>
<tr>
<td>[66]</td>
<td>Experimental analysis of plumes transport and dilution processes under highly transient boundary conditions.</td>
<td>Mónica Basilio Hazas; Francesca Ziliotto; Massimo Rolle; Gabriele Chiozona</td>
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<tr>
<td>[647]</td>
<td>Multi-Scale Benchmarking of a Coupled Geochemical Transport Solver.</td>
<td>Saideep Pavuluri; Christophe Tournassat; Francis Claret; Cyprien Soulaine</td>
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<tr>
<td>[740]</td>
<td>The Peclet number and viscous ratios impact on the fingering evolution during miscible displacement in rough fractures.</td>
<td>Xusheng Chen; Ran Hu; Yang Zhibing; Chen Yi-Feng</td>
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<tr>
<td>[874]</td>
<td>Turbulent mixing in the hyporheic zone.</td>
<td>Elisa Baioni; Giovanni Michele Porta; Mohaddeseh Mousavi Nezhad; Alberto Guadagnini</td>
</tr>
<tr>
<td>[1223]</td>
<td>Hydrodynamic Dispersion in Simple Pore Geometries: Combining Experimental and Simulated Results at Individual Pore Scales.</td>
<td>Matthijs de Winter; Kilian Weishaupt; Stefan Scheller; Stefan Frey; Amir Raoof; S. Majid Hassanizadeh; Rainer Helmig</td>
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<tr>
<td>[763]</td>
<td>A novel upscaling procedure for characterising heterogeneous shale porosity from nm- to mm-scale in 3D and 4D images.</td>
<td>Lin Ma; Patrick Dowey; Ernest Rutter; Kevin Taylor; Peter Lee</td>
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Question and answer: Parallel sessions 3 (cont.)

(MS 8) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media – Part 2

Q&A 2 10:40 – 11:40 - Chairs: Branko Bijeljic, Marco Dentz

- Efficient Simulation of Reactive Flow in Reservoirs Rocks at the Pore Scale.  
  Christian Hinz; Jens-Oliver Schwarz; Andreas Weber; Andreas Wiegmann

- Scaling Analysis of Immiscible Two-Phase Flow in Porous Media with Fractal Permeability Fields.  
  Saman Aryana; Yuhang Wang; Jesse McKinzie; Frederico Furtado

- Experimental Study on Influence of Peclet number on the Dissolution patterns in rough fractures.  
  Ting Wang; Ran Hu; Zhibing Yang; Yifeng Chen

- Flow behavior of CO2/ N2/ CH4 huff and puff process for enhanced heavy oil recovery.  
  Wu Mingxuan; Zhaomin Li; Songyan Li; Chen Lu; Zhengxiao Xu

- Plume deformation, mixing and reaction kinetics in 3-D heterogeneous anisotropic porous media.  
  Yu Ye; Gabriele Chiogna; Chunhui Lu; Massimo Rolle

- Upscaling Diffusive Transport in Terms of Porosity Statistic.  
  Alraune Zech; Matthijs de Winter

- Multiscale flow simulation of shale oil considering hydro-thermal process.  
  Zijie Wang; Jun Yao

(MS 8) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media – Part 3

Q&A 3 15:00 – 15:55 - Chairs: Hossein Hejazi, Amir Raoof

- Numerical simulation of convective mixing in geologic carbon sequestration applications.  
  Anna-Maria Eckel; Ronny Pini

- Chemical Component Transport in Heterogeneous Porous Medium during Low Salinity Water Flooding.  
  Hasan Al-Ibadi; Karl D. Stephen; Eric Mackay

- Fractal analysis of shape factor for matrix-fracture transfer function in fractured reservoirs.  
  Lan Mei; Jianchao Cai; Qingbang Meng; Qiuying Sun; Shuang Li

- Investigation of carbonation and degradation of well cement under geologic carbon sequestration using X-ray imaging and numerical modeling.  
  Xiuxiu Miao; Liwei Zhang; Yan Wang; Manguang Gan

- Multi-rate mass transfer models and reactive transport in heterogeneous porous media.  
  Federico Municchi; Matteo Icardi; Federico Municchi.
Monday, 31 August 2020

Question and answer: Parallel sessions 3 (cont.)

(MS 8) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media – Part 3 (cont.)

**Q&A 3 15:00 – 15:55 - Chairs: Hossein Hejazi, Amir Raoof**

[675] Studying the effects of heterogeneity on karstification and wormholing phenomena using Operator Based Linearization and High-Resolution LiDAR data.
*Stephan de Hoop; Denis Voskov; Giovanni Bertotti*

[160] The topological origin of anomalous transport: Persistence of $\beta$ in the face of varying correlation length.
*Yaniv Edery*

[812] Volumetric response of crushed dunite during carbonation reaction under controlled $\sigma$-P-T conditions.
*Jinfeng Liu; Timotheus Wolterbeek; Christopher Spiers*

(MS 11) Microfluidics in porous systems– Part 1

**Q&A 4 16:00 – 16:55 - Chairs: Hassan Mahani, Afshin Goharzadeh**

[264] Experimental study of corner flow using 2.5-D microfluidic porous media.
*Guanju Wei; Ran Hu; Zhen Liao; Yifeng Chen*

[272] Foam Trapping and Foam Mobility in a Model Fracture.
*Kai Li; William Rossen; Karl-Heinz Wolf*

*Antonia Sugar; Serag F. Maged; Victor A. Torrealba; Ulrich Buttner; Satoshi Habuchi; Hussein Hoteit*

*Menggang Wen; Yun Li*

[784] A Microfluidic Investigation of In-Situ Water-in-Oil Emulsion Formation during Waterflooding of Heavy Oil Reservoirs.
*Mohammad Salehpour; Zahra Sakhaei; Hassan Mahani; Masoud Riazi;*

[245] 3D printing micro-model and deep learning method application for micro displacement experiment and remaining oil analysis.
*Yimin Zhang; Chengyan Lin; Lihua Ren; Yuqi Wu*

[403] Fabrication of “sandwich-like” microfluidic chips by ceramic 3D printing for flow visualization experiments.
*Shidong Li; Sibani Lisa Biswal; Ole Torsæter; Hon Chung Lau; Ludger Paul Stubbs*

*Saheb Mohammadi; Hassan Mahani; Shahab Ayatollahi; Vahid J Niasar*

[129] Dynamics of liquid bridge on moving porous substrates.
*Si Suo; Yixiang Gan*
Monday, 31 August 2020

Question and answer: Parallel sessions 3 (cont.)

(MS 8) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media – Part 4

Q&A 5 18:45 – 19:40 - Chairs: Amir Raoof, Hossein Hejazi

Cunqi Jia; Jun Yao

[1200] In Operando synchrotron microfluidics experiment and reactive transport modeling of acid erosion of carbonate fractures.
Hang Deng; Jeff FITTS; Ryan Tappero; Julie Kim; Catherine Peters; Qian Zhang

Madiha Khadhraoui; John Molson; Najat Bhiry

Martin Lesueur; Thomas Poulet; Manolis Veveakis

[1233] The effect of buoyant convection on the buoyancy-driven spreading and draining that arises within a layered porous media with a permeability jump.
Md Imran Khan; K. S. Bharath; M. R. Flynn

[1202] Buoyant convection in porous media: Multiple layers separated by an inclined permeability jump.
K. S. Bharath; Morris Flynn

[484] Radionuclide transport and retention at the core scale identified by GeoPET analysis and reactive transport modeling.s
Tao Yuan; Johannes Kulenkampff; Till Bollermann; Cornelius Fischer

Wanying Pang; Zhehui Jin

(MS 11) Microfluidics in porous systems– Part 2

Q&A 6 19:45 – 20:40 - Chairs: Florian Doster, Yves Méheust

[1275] Capillary flow mediated drop formation in a yarn-based microfluidic system.
Bhaskarjyoti Sarma; Amaresh Dalal; Dipankar Narayan Basu

[1043] Role of Connate Water in Immiscible Viscous Fingering.
Lucas Mejia; Matthew Balhoff; Kishore Mohanty

Ningyu Wang; Yifei Liu; Matthew Balhoff; Masa Prodanovic

[146] An analytical fractal model for water transport in shale reservoirs.
Yu Zhang; Jianchun Guo; Fanhui Zeng; Yu Zhang; Wenxi Ren; Jianhua Xiang
**Monday, 31 August 2020**

Question and answer: Parallel sessions 3 (cont.)

(MS 11) Microfluidics in porous systems—Part 2 (cont.)

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<th>Q&amp;A 6 19:45 – 20:40 - Chairs: Florian Doster, Yves Méheust</th>
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<tr>
<td>[81] Visualization of CH₄ Hydrate Dissociation Under Permafrost Temperature Conditions Using High-Pressure Micromodel.</td>
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<tr>
<td>Jyoti Shanker Pandey; Stian Almenningen; Nicolas von Solms; Geir Ersland</td>
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<td>William Johnson</td>
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<td>Jiwei Wu; Thomas Cochard; Lizhi Xiao; David A. Weitz</td>
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<tr>
<td>Rumbidzai, A. E Nhunduru</td>
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<tr>
<td>Afsjin Davarpanah; Holstvoogd Jorijn; Simon Cox; William Rossen</td>
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Canon Production Printing develops and manufactures high-tech printing products and workflow software for the commercial printing market. The product offering includes continuous-feed and cut-sheet printers for high-volume printing and publishing, and large-format printers for display graphics and CAE/GIS applications.

Canon Production Printing has an impressive track record of innovation. These achievements are possible due to high quality and dedicated employees, significant investments in human and technical resources as well as profitable synergies with external parties.

Theoretical, numerical and experimental research in thin porous media and their interactions with a large variety of fluids is of great importance for several industries and products. For Canon Production Printing the most relevant instance of liquid interaction with porous paper is in the inkjet printing with water-based inks. Note that the phenomena associated with ink-media interactions is highly complex due to the media characteristics, the ink properties and the time scale of the physico-chemical processes.

The collaboration between the Canon Production Printing and the InterPore society started in 2012 and since then it has grown continuously. InterPore is the forum where technical and scientific questions are debated and the future research in the field of porous materials is penciled. Canon Production Printing is generating knowledge and experiments in the field of porous materials and their interactions with complex liquids.
3D visualization, analysis and simulation of your porous media from a single environment

Characterization of porous material depends on the size, distribution, and shape of pores and possibly the channels connecting them. For other materials and applications, such as ceramic or glass, understanding the distribution of the different particle types is of utmost importance for estimating performance of the material. To effectively characterize your material, you need to understand important parameters such as porosity, tortuosity, and permeability.

With our Thermo Scientific™ Avizo™ Software solutions for materials science and Thermo Scientific™ PerGeos Software for digital rock analysis, you can easily analyze, visualize and apply simulation to your imaging data from a single environment allowing automation and customization so you can focus on what matters most.

Join us at our booth at Interpore to find out more, or visit us online thermofisher.com/pergeos
MONDAY, 31 AUGUST 2020
Time Block B

Opening Ceremony
13:30 - 13:40 CET

Award Ceremony
13:40 - 13:50 CET

InterPore Honorary Lifetime Membership Award
Harry Vereecken
Forschungszentrum Jülich, Germany

Keynote Lecture
13:50 - 14:35 CET

Aimy Bazylak
University of Toronto

Designing porous materials for improved fuel cell and electrolyzer performance

The polymer electrolyte membrane (PEM) fuel cell and electrolyzer are composed of multiple porous materials, including the catalyst layer, microporous layer, and substrate. Commercial materials, whether by design or not, typically exhibit highly heterogeneous material and chemical properties. In order to reach cost targets for widespread commercial adoption, we must realize materials that enable more effective multiphase flow phenomena than what currently exists. Mass transport losses in PEM fuel cells and electrolyzers are both prohibitively significant. However, designing these materials requires the a priori knowledge of how the heterogeneous properties of the porous materials and their interfacial contacts influence electrochemical performance. In this work, I will discuss these critical design factors.
Keynote Lecture (cont.)
13:50 - 14:35 CET

(heterogeneous porous materials and nature of interfacial contacts) and how they influence the flow and mass transport behaviour in PEM fuel cells and electrolyzers. I will also discuss the new materials we have designed and fabricated, informed by in-house numerical modelling and tested through a combination of in operando and ex situ X-ray and neutron beam characterization approaches.

Plenary Pitch
14:35 - 14:40 CET

Branko Bijeljic
Imperial College London

Scale-dependence of Reaction Rates in Porous Media & Physical and Chemical Heterogeneity

Reactive transport of solutes in porous media is encountered in many applications, such as contaminant transport and remediation in subsurface, acidization to enhance permeability in oil recovery, and packed bed reactors in chemical engineering. A principal outstanding problem in subsurface reactive transport is to determine the effective reaction rates from the pore-scale upwards. This is of key importance in highly heterogeneous natural porous media such as carbonate rock. Carbonates are known to have a significant portion of their pore space as micro-porosity, which may lead to a very wide distribution of local velocities, increasing transport heterogeneity that affects mixing and ultimately reaction. Hence, there is a need for a systematic methodology that can identify and quantify the impact of physical and chemical heterogeneity on the reaction rates. Moreover, in many problems additional complexities arising from coupling of multispecies transport and reaction reversibility need to be accurately addressed.

We develop a new methodology termed Screening Pore-Scale Imaging and Modelling (SPIM) that can be used to predict the fluid/solid reaction rates based
on the systematic characterization of both physical and chemical heterogeneity in multi-mineral systems [1-3]. Physical heterogeneity of the rocks is classified in accordance with the velocity distributions obtained by numerical flow simulation on dry micro-CT images. Spatial distribution of chemical heterogeneity is also provided from the images. Performing and analyzing coreflooding CO2/brine/carbonate experiments, we show that mineral reaction rates are an order of magnitude lower than the corresponding batch rates due to mass transfer limitations. We introduce a new metrics quantifying coupled reactive transport behaviour, which describes proximity of reacted minerals to the fast channels and slow regions. Overall, a higher degree of physical (initial pore structure and associated velocity field) and/or chemical (intrinsic reaction rates and mineral distribution) heterogeneity promotes the preferential channelling effect, as opposed to uniform dissolution.

Furthermore, we simulate 3D multispecies fluid/fluid reversible reactive transport [4] in a micro-CT image of carbonate rock that entails spatially resolved information on connected micro-porosity. Direct numerical simulation of Darcy-Brinkman [5] and advection-diffusion transport equations are coupled to a general geochemical model [6]. We demonstrate salient features of mixing and reaction arising as a result of intricate pore space heterogeneity. We show that evolution of rates of formation and consumption is species-dependent, and highly distinct in macro- and micro-porosity. Well-mixed regions result in asymptotic reaction rates. In contrast, incomplete mixing leads to transient and, for some species, even non-monotonic reaction rate behaviour.

Overall, we conclude that reactive behaviour is simultaneously influenced by pore space heterogeneity, multispecies reactive transport, and reaction reversibility. This means that for complex reversible reactions in heterogeneous porous media, species-specific behaviour needs to be examined for an accurate determination of reaction rates.
Invited Speakers: Parallel Session 2
18:00 - 18:30 CET

Olga Vizika
IFPEN

Multi-scale in-situ fluid monitoring to understand and model multiphase flow in porous media

Transport phenomena in porous media are encountered in many situations of practical and scientific interest, where determination of transport properties remains a challenging issue. They may concern natural porous media, such as soils, aquifers or hydrocarbon reservoirs, or artificial ones, such as filters, fuel cells, catalysts and concrete.

Multiphase flow in natural porous media is essential in a wide range of phenomena and applications in geosciences, including hydrocarbon formation and migration, oil and gas production, enhanced oil recovery, underground energy or CO2 storage, water resources management or soil remediation. Understanding and predicting fluid displacement mechanisms at the relevant scale is one of the big challenges in basin and reservoir modeling.

The description of the transport of fluids in geological formations relies upon advances on the characterization and modeling of natural systems in a large spectrum of time and length scales. The complexity of transport processes in these systems is due to the natural complexity and heterogeneity of geological structures as well as to the dynamics of the multiphase fluid displacement and its coupling with mechanical, thermal, chemical and biological processes.

Information on the pore space geometry and topology and on fluid displacement is essential to understanding of mechanisms and modeling. In 2D, micromodel experiments and advances in microfluidics bring qualitative and quantitative information on the motion of fluid/fluid interfaces in model systems down to the micron scale. In 3D, X-Ray 3D-imaging has proved to be a key technology to study multiphase flow in porous media with a continuous quest for space and time resolution.

Experimental observation has to be intimately linked to pertinent theoretical modeling taking into account the relevant physics of the studied phenomena at the right scale. Advances in molecular dynamics, lattice-Boltzmann or pore-network modeling methods combined to upscaling considerations permit to simulate complex flow regimes and to run laboratory and numerical experiments on comparable sample volumes.

Through selected examples, on the combination of experimental observation and theoretical analysis at different scales, we demonstrate the necessity of adapting space and time scale to the studied phenomenon, and the complementarity of different methods to investigate multiphase flow in porous media.
Muhammad Sahimi
University of Southern California


Flow, transport, reaction, adsorption and deformation (FTRAD) constitute a fascinating set of phenomena that occur in a wide variety of porous media and materials over widely disparate length scales, from molecular, to pore, core, and field scales.

In this presentation four classes of fundamental problems are described and the approaches to their modeling are discussed. We first describe a process-based modeling of fabrication of a nano-porous membrane based on quantum mechanical calculations and molecular dynamics simulations. We then outline a general approach to modeling of adsorption and swelling of several types of core-scale porous materials. Next, the problem of reconstruction of porous materials and media based on limited data, such as their two- or three-dimensional images is described, and a new method based on curvelet transforms for speeding up simulation of the FTRAD in such images is discussed. Finally, the problem of upscaling from core to field scale is described and a multiresolution approach to the problem based on wavelet transformations is discussed.
Award Ceremony
9:00 - 9:10 CET

**Procter & Gamble Award for Thin and Swelling Porous Media Research**
Amir Raoof
*Utrecht University, The Netherlands*

*A word of gratitude:*
This award has been made possible by a generous grant from [Procter and Gamble](https://www.procterandgamble.com). Two billion times a day, P&G brands touch the lives of people around the world. Their products have made a name for themselves by combining “what’s needed” with “what’s possible”—making laundry rooms, living rooms, bedrooms, kitchens, nurseries, and bathrooms a little more enjoyable for over 181 years.

**InterPore Award for Excellence in Porous Media Research**
Tanguy Le Borgne
*University of Rennes, France*
Keynote Lecture
9:10 - 9:55 CET

Signe Kjelstrup
Norwegian University of Science and Technology

Addressing the water scarcity problem with thermal osmosis

To describe flow in porous media Darcy’s law has been central, and rightly so. The pressure difference, or more generally the chemical potential difference, is a major driving force of flow. Other driving forces for transport, electric and gravitational fields for instance, have more particular applications. Less is known on thermal driving forces for transport in porous media. On the other hand, not only industry, also nature provide large amounts of waste heat. The use of this heat to do useful work, is therefore of interest, theoretically as well as practically. In this lecture, I will examine the theoretical and practical conditions for a particularly important case of two-phase flow in porous media; namely the flow of water using vapor-gap membranes and a waste heat source to provide a driving force. The phenomenon is called thermal osmosis. In thermal osmosis, heat can be used to clean water and drive a turbine, as well. In nature, the phenomenon can be related to frost heave.

There is a world-wide scarcity of clean water, and the United Nations have declared that the decade 2018-2028 be used to “Avert a global water crisis”. In this contribution to help avert the problem, we shall see that the theoretical basis of non-equilibrium thermodynamics can help understand the mechanism of thermal osmosis. An exact description can then follow and lend itself to experimental control and optimization. Other applications are close at hand.
Flow diagnostics for fractured reservoirs: An innovative way to account for geological and geomechanical uncertainty in modern reservoir modelling and simulation workflows

Fractured reservoirs are abundant in the subsurface and crucial to the provision of energy (e.g. oil, gas, geothermal) and groundwater, as well as for the storage of CO2. Yet, these reservoirs are very difficult to characterise, develop, and manage due to their complex and uncertain geology. Fractures can also open or close as the stress state in the reservoir changes during production, adding further complexities to the reservoir management. Modern reservoir simulation and uncertainty quantification workflows allow us to support the design of field development and management plans that account for geological uncertainties. However, simulating these reservoirs is not trivial and the time spent running full-physics reservoir simulations is valuable; it should be used for studying models that explore a realistic range of (geological) uncertainties and hence provide the most insight.

We have developed new flow diagnostics tools for naturally fractured reservoirs which sacrifice some physical detail in exchange for speed but still allow us to compute some of the essential dynamic behaviours in the reservoir, e.g. how effectively wells communicate with each other or which wells are at risk of early breakthrough. A particular innovative addition to our flow diagnostics is that we can also account for geomechanical effects in the reservoir; we can therefore quickly evaluate if and where fractures are likely to open or close, and how reservoir dynamics evolve as a consequence, due to production-induced stress changes.

Our new technology enables us to screen large numbers of geological models based on their approximate dynamic and geomechanical behaviours in a matter of minutes prior to commencing more time-consuming full-physics reservoir simulations. Using intuitive metrics we quantify the reservoir dynamics to cluster models and reduce the number of full-physics simulations required for robust reservoir forecasting without affecting the original range of geological and geomechanical uncertainties. Flow diagnostics hence offer a natural pre-processing step that complements modern coupled hydro-mechanical reservoir simulation, uncertainty quantification, and optimisation workflows, allowing us to spend valuable simulation time on the cases that yield a greatly improved understanding of reservoir performance and related uncertainties.
Gain insights into your porosity across length scales

**ZEISS suite of microscopy solutions for understanding pore structures:** A range of length scales. A suite of modalities. A variety of materials.

**ZEISS 3D X-ray Microscopes**

**Oil & Gas:** Acquire pore scale information based on macroscopic heterogeneity for quantitative upscaling

**Ceramics:** Understand porosity, voids, and phases in 2D and 3D to design your desired microstructure and flawless ceramic parts

**Energy materials:** Understand gas transport in fuel cells, or lithium ion transport in batteries, from the bulk phase down to local submicron scale, with 3D tomographic imaging from tens of microns to the nanoscale

**Solid foams:** Solve typical imaging problems for submicron foam porosity of low-Z polymers; study *in situ* to understand load bearing and structural applications

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Timing of Q&A sessions on Tuesday

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<th>Parallel sessions 2</th>
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<td>MS13, part1</td>
<td>MS17, part1</td>
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<td>A (11:05 – 12:00)</td>
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<td>MS1, part2</td>
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<td>MS13, part3</td>
<td>MS14, part1</td>
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<td>B (15:35 – 16:30)</td>
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<td>MS13, part4</td>
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<td>MS13, part5</td>
<td>MS18, part2</td>
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<td>C (19:00 – 19:55)</td>
<td>Q&amp;A 12</td>
<td>MS1, part6</td>
<td>MS4</td>
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<td>C (20:00 – 20:55)</td>
<td>Q&amp;A 13</td>
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Question and answer: Parallel sessions 1

(MS1) Porous Media for a Green World: Energy & Climate – Part 1

Q&A 7 10:05 – 11:00 - Chairs: William Rossen, Rainer Helmig

[1273] Introducing the concept of Paradise Island for quantifying the role of subsurface porous media in the green transition.
Ali Akbar Eftekhari

[828] CO2 Transport and Mineralization in Reactive Magnesium Cement-Based Concrete.
Anna Herring; Penny King; Fatin Mahdini; Afiq Muzhafar Kemis Yahyah; Mohammad Saadatfar

[432] Assessment of Conglomerate Reservoir for CO2 Sequestration using X-ray CT image Analysis.
Gidon Han; Weon Shik Han; Kue-young Kim Kim; Jize Piao

Jie Li; Jiaxiang Liu; Wenquan Tao; Zhuo Li

[246] Upscaling capillary pressure functions for modeling vertical migration of CO2 in brine aquifers.
Kan Bun Cheng; Avinoam Rabinovich

Mianmo Meng; Hongkui Ge; Yinghao Shen; Qinhong Hu

[92] Quantitative evaluation of mobile shale oil at different pore sizes.
Ning Qi; Mingyue Lu; Haitao Xue; Jinxiu Yang; Bojie Zhang; Dongquan Sun; Xueping Liu; Jiafan Tang

[1049] Integrating geological data and upscaling static and dynamic properties for a CCS project.
Mark Knackstedt; Mohammad Saadatfar; Robert Sok; Paal Eric Oeren; Lachlan Deakin
Question and answer: Parallel sessions 1 (cont.)

(MS1) Porous Media for a Green World: Energy & Climate – Part 2

**Q&A 8 11:05 – 12:00 - Chairs: Rainer Helmig, William Rossen**

[1199] Valuation criteria of shale gas reservoir classification—taking Longmaxi formation in Pengshui area as an example.  
Ning Qi; Mingyue Lu

[105] Experimental Studies on Carbonated Smart Water-flooding Mechanisms in Tight Reservoir.  
Rukuan Chai; Yuetian Liu; Liang Xue; Jing Xin

[1071] CO2 Mobility Control by Foam at the Pore Level.  
Tore Føyen; Malin Haugen; Benyamine Benali; Martin A Fernø

Yingwen Li; Yongfei Yang

[1212] Study on Mechanism of Nitrogen Stimulation Production Aided by Viscosity Reducer in common heavy oil.  
Yunong Zang; Binfei Li

[1193] Capillary heterogeneity trapping within the Captain Sandstone - a core to field scale study.  
Catrin Harris; Sam Krevor; Samuel Jackson; Ann Muggeridge; Alistair Jones

[1143] Development of multi-physics models accounting for reversible flow at various subsurface energy storage sites.  
Beatrix Becker; Bernd Flemisch; Rainer Helmig; Bo Guo; Karl Bandilla; Mike Celia

[1165] Research on geological modeling of porosity and permeability in CO2 gas reservoirs—Taking Surennuor area as an example.  
Ning Qi; Mingyue Lu

(MS1) Porous Media for a Green World: Energy & Climate – Part 3

**Q&A 9 14:35 – 15:30 - Chairs: Julien Maes, William Rossen**

Jeroen Snippe; Niko Kampman; Kevin Bisdom; Tim Tambach; Rafael March; Tomos Phillips; Nathaniel Forbes Inskip; Florian Doster; Andreas Busch

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Mohammad Masoudi; Saeed Parvin; Rohaldin Miri; Helge Hellevang

[770] Geothermal Simulation Using MRST.  
Øystein Klemetsdal; Marine Collignon; Olav Møyner; Halvor Nilsen; Odd Andersen; Knut-Andreas Lie
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| [983] Low Salinity Water-flooding in Chalk Core Samples from a Danish North Sea Reservoir.  
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| [970] Effect of aging method on wettability and oil recovery from danish north sea carbonate reservoirs.  
Samira Mohammadkhani; Jonas Folke Sundberg; Ming Li; Karen Louise Feilberg |
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| [1141] Optimizing carbon dioxide storage in oilfields at the pore-scale.  
Abdulla Alhosani; Qingyang Lin; Alessio Scanziani; Branko Bijeljic; Martin Blunt |

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| [1227] Carbon Dioxide Plume in Bespoke 2D Porous Micromodels.  
Niloy De; Patrice Meunier; Yves Méheust; François Nadal |
| [992] Experimental Investigation on the Effects of Ion Type/Valency and Ionic Strength of Formation Water on Rock-Fluid Interactions during CO2 Geological Storage.  
Shima Ghanaatian; Omid Shahrorkhi; Susana Garcia; M. Mercedes Maroto-Valer |
| [1246] Numerical Simulation of CO2 enhanced gas recovery (CO2-EGR) for the optimal CO2 injection perforation position and injection rate.  
Liu Shuyang; Sun Baojiang |
| [315] Evaluation of CO2 enhanced recovery potential as pre-pad in tight reservoir compared with slickwater.  
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Chidera Iloejesi; Lauren Beckingham

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[1240] Buoyant convection from a discrete source in closed vs. leaky porous media. 
Morris Flynn; Chunendra K. Sahu; Mark Roes

[1013] Redistribution of residually trapped CO2 by Ostwald ripening due to capillary heterogeneity. 
Yaxin Li; Charlotte Garing; Sally M Benson

[1019] Parametric study on the residual CO2 trapping in Deccan Volcanic Basalt. 
Pradeep Reddy Punnam; Shakti Raj Singh Bawal; Himavarsha Pakala; Vikranth Kumar Surasani

[68] A vertically integrated approach to field-scale modelling of mineral trapping in reactive rocks. 
Tom Postma; Karl Bandilla; Mike Celia

[104] Pore connectivity of shale oil reservoirs from small angle neutron scattering, mercury intrusion porosimetry and spontaneous imbibition experiments. 
Xiaohui Sun; QinHong Hu; Binyu Ma; Tao Zhang; Mianmo Meng; Shengyu Yang; Xiugang Pu; Wenzhong Han

[39] The grading evaluation and sweet spot prediction of shale reservoirs based on high-pressure mercury intrusion technology and fractal theory. 
Yu Zhang; Rixin Zhao

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Jyoti Shanker Pandey; Nicolas von Solms

[827] Use of limited deep formation monitoring data with shallow aquifer observations for leakage monitoring in geologic carbon storage. 
Tissa Illangasekare; Ahmad Askar; Jakub Solovský; Radek Fucik; Ye Zhang; Jiangyin Jiao; Andrew Trautz

[563] The Seebeck effect in membrane systems of ions abundant in seawater. 
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- [696] Using 2D seismic line data to estimate the possible impact of large-scale and sub-scale structural trapping in the Gassum Formation on the Norwegian Continental Shelf.  
  *Odd Andersen; Anja Sundal; Halvor Nilsen*

- [373] Utilization of microporous materials as multi-functional proppant for enhanced shale gas and recovery and CO2 sequestration.  
  *Kaiyi Zhang; Guan Qin*

- [1243] Sedimentary Sedimentary Study and Application of the Lower Fourth Member of Shahejie Formation in Chenguanzhuang Area.  
  *Zongwei Zhang*

- [142] Study on tight oil seepage characteristics based on digital cores.  
  *Yixin Cao; Ning Qi; Xinlei Yuan*

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- [972] Impact of pair interactions on frictional fluid dynamics  
  *Louison Thorens; Knut Jorgen Maloy; Mickaël Bourgoin; Stéphane Santucci*

- [1187] Thin film flow: fluid transport via thin liquid films in slow porous media flows  
  *Marcel Moura; Knut Jørgen Måløy; Eirik Grude Flekkøy; Gerhard Schäfer; Renaud Toussaint*

- [1301] Physical origin of pressure-saturation curves during drainage: modelling based on gravitational and capillary effects, and recipe for upscaling by correcting finite-size effects  
  *Renaud Toussaint; Monem Ayaz; Gerhard Schäfer; Marcel Moura; Knut Jorgen Maløy*

- [846] Benchmarking root and soil interaction models exemplified with CRootBox and Dumux.  
  *Daniel Leitner; Andrea Schnepf*

- [1154] Bistability in the unstable flow of polymer solutions through porous media  
  *Christopher Browne; Audrey Shih; Sujit Datta*

- [1009] Pore system evaluation of a bi-modal carbonate rock using a suite of low field NMR and microCT techniques.  
  *Jun Gao; Ahmad AlHarbi; Hyung Kwak*

  *Zhou Fang; Jifeng Qu; Caiqi Zhang; Lei Zhang; Guangming Pan*

- [1105] Liquid-gas penetration through the complex three-dimensional porous media.  
  *Yu Shi; Xiao-na Yang*
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[1160] Molecular Simulation Study of Inorganic and Organic Porous Materials
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[646] Nondestructive high-throughput screening of nanopore geometry in porous membranes by imbibition: Laser-Interferometry and Dilatometry Experiments
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[334] Distribution of oil in shale formations and its effects on kerogen nano-structural properties
Qian Sang; Xinyi Zhao; Mingzhe Dong

[250] Adsorption Evaluations of Shale Gas in Nanometer Pores Based on Molecular Simulation Method
Sun Renyuan; Sun Ying; Tang Guiyun; Gong Dajian; Cao Haipeng

[1132] The effects of oxidation on the capacity of shale gas desorption and diffusion in nanoscale pores
Yang Zhou; Lijun You; Yili Kang; Qiuyang Cheng; Yang Chen

[528] Fractal analysis of real gas transport in 3D shale matrix
Zhenhua Tian; Jianchao Cai; Yihua Xiong; Haitao Tian; Kai Xu

[297] Imbibition-Induced Deformation Dynamics in Nanoporous Media: The Interplay of Bangham and Laplace Pressure Effects
Zhuoqing Li; Juan Sanchez Calzado; Michael Fröba; Patrick Huber

[1103] Study on the distribution of micro remaining oil in different sedimentary microfacies by using glass etching displacement experiments
Yapu Zhang; Zhengming Yang; Yanzhang Hhuang; Xingwang Shi; Haitao Hou

Q&A 8 11:05 – 12:00 - Chairs: Gennady Gor, Patrick Huber

[1157] Evaporation and condensation of water in nanopores with salt
Olivier Vincent; Piyush Jain; Marine Poizat; Léo Martin; Abraham Stroock

[779] Viscosity of hydrocarbons in slit pores by molecular dynamics
Vasily Pisarev; Nikolay Kondratyuk

[596] Study on the distribution of micro remaining oil in different sedimentary microfacies by using glass etching displacement experiments
Xianbo Luo

[1325] The effects of oxidation on the capacity of shale gas desorption and diffusion in nanoscale pores
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[559] Adsorption and Flow Behaviors of Shale Oil in Organic Slit by Molecular Simulation
Jie Liu; Yongfei Yang; Jun Yao
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### (MS 13) Fluids in Nanoporous Media – Part 2 (cont.)

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- [1285] Extension and Limits of Cryoscopy for Nanoconfined Solutions  
  *Benjamin Malfait; Alban Pouessel; Aicha Jani; Denis Morineau*

- [489] Giant Piezoelectrolytic Actuation in Nanoporous Silicon-Polypyrrole Membranes  
  *Manuel Brinker; Guido Dittrich; Thelen Marc; Lakner Pirmin; Claudia Richert; Tobias Krekeler; Thomas F Keller; Norbert Huber, Patrick Huber*

  *Mark Busch; Tommy Hofmann; Bernhard Frick; Jan Embs; Boris Dyatkin, Patrick Huber*

### (MS 13) Fluids in Nanoporous Media – Part 3

**Q&A 9 14:35 – 15:30 - Chairs: Gennady Gor, Patrick Huber**

- [1267] Water Dynamics in Nanoporous Confinement: A Quasielastic Neutron Scattering Study  
  *Aicha Jani; Benedikt Mietner; Mark Busch; Jacques Olliver; Bernhard Frick; Markus Apple; Jean-Marc Zanotti; Patrick Huber; Michael Fröba; Denis Morineau*

- [267] Small Angle Neutron Scattering to determine the Interplay between Fluids and Pores in Mudrocks  
  *Amirsaman Rezaeyan; Timo Seemann; Pieter Bertier; Vitaliy Pipich; Lester Barnsley; Andreas Busch*

- [1302] Dynamic Heterogeneities in Liquid Mixtures Confined in Nanopores  
  *Aicha Jani; Ramona Mhanna; Benedikt Mietner; Mark Busch; Jean-Marc Zanotti; Bernhard Frick; aziz ghoufi; Patrick Huber; Michael Fröba; Denis Morineau*

- [117] A serially-connected pore model (SCPM) for characterising disordered mesoporous materials  
  *Henry Enninful; Daniel Schneider; Richard Kohns; Dirk Enke; Rustem Valiullin*

- [116] Characterisation of strongly disordered mesoporous solids with the serially-connected pore model (SCPM)  
  *Henry R. N. B. Enninful; Daniel Schneider; Antonia Hoppe; Dirk Enke; Rustem Valiullin*

- [457] Physically-based combined model for water retention of cementitious materials  
  *Walaa Issa; Jean-Philippe Carlier; Nicolas Burlion*

- [898] Stochastic apparent permeability model considering pore-throat structures and fluid-solid molecular interactions for shale oil reservoir  
  *Jilong Xu; Yuliang Su; Wendong Wang; Han Wang*

- [635] Permeation and separation of CH4/CO2, N2/O2 mixtures through single-layer nanoporous graphene membranes : theory and molecular simulations  
  *Juncheng Guo; Romain Vermorel; Guillaume Galliero*
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**Q&A 10 15:35 – 16:30 - Chairs: Gennady Gor, Patrick Huber**

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**MS 13) Fluids in Nanoporous Media – Part 5**

**Q&A 11 18:00 – 18:55 - Chairs: Gennady Gor, Patrick Huber**

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THE FUTURE.
YOURS TO MAKE.

“I want to be able to look back
And say I played my part”

Ryan
Engineer at Shell

Read my letter to the future at shell.com/letters
### (MS 13) Fluids in Nanoporous Media – Part 5 (cont.)

#### Q&A 11 18:00 – 18:55  
**Chairs:** Gennady Gor, Patrick Huber

  **Yu Pang; Sen Wang; Shengnan Chen**

- [997] Wetting dynamics of nanoliter water droplets in nanoporous media  
  **Bin Pan; Christopher Clarkson; Marwa Atwa; Chris DeBuhr; Amin Ghanizadeh; Viola Birss**

- [103] Impact of solvent extraction on the petrophysical analysis of lacustrine shale  
  **Hongguo Qiao; Qinhong Hu; Shengyu Yang; Binyu Ma; Wenzhong Han; Xiaohui Sun; Xiuchuan Zhu; Xiugang Pu**

#### (MS 4) Swelling and shrinking porous media

#### Q&A 12 19:00 – 19:55  
**Chairs:** Jacques Huyghe, Sridhar Ranganathan, Muhammad Sahimi

- [1303] The coupling between compaction and pressurization in cyclically sheared drained granular layers: implications for soil liquefaction.  
  **Shahar Ben Zeev; Renaud Toussaint; Liran Goren; Stanislav Parez; Einat Aharonov**

- [1206] Swelling properties in reinforced polymeric ion-exchange membranes.  
  **Íñigo Lara; Sagrario Muñoz; V. María Barragán García**

  **Jianting Huang; Jintao Wu; Guangming Pan; Hao Li; Zhenpeng Li**

- [1062] Extremely large deformation and fracture of hydrogels.  
  **Jacques Huyghe; Eanna Fennell**

- [335] Deformation of kerogen and its effects on oil flow in shale.  
  **Xinyi Zhao; Qian Sang; Yajun Li; Houjian Gong; Mingzhe Dong**

  **Yuntian Teng; Zihao Li; Weiyu Zheng; Cheng Chen**

- [323] Modelling the drying shrinkage of porous materials incorporating capillary and adsorption effects.  
  **Ginger El Tabbal; Patrick Dangla; Matthieu Vandamme; Marina Bottoni; Sylvie Granet**

  **Jean Lachaud; Michael Meyer; Cyrille Metayer; Marin Virey; Wahbi Jomaa; Jérémy Meurisse**
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(MS 23) Special Session for Professor Rainer Helmig – Part 1

**Q&A 13 20:00 – 20:55 - Chairs: Bernd Flemisch, Martin Schneider**


[1158] Equilibria, kinetics, constraints, and multiple scales. *Malgorzata Peszynska; Choah Shin*

[1074] Effects of Quasi-Saturation on Water Table Dynamics, Estimated Recharge Rates, and Groundwater Modeling. *Roger Gonçalves; Hung K. Chang; Martinus van Genuchten*

[957] From open source to open workflows? *Lars Bilke; Jörg Buchwald; Thomas Fischer; Thomas Kalbacher; Olaf Kolditz; Thomas Nagel; Dmitri Naumov; Erik Nixdorf; Karsten Rink; Haibing Shao; Wenqing Wang*

[680] Research collaboration Highlights: A tribute to Rainer Helmig. *Al Cunningham*

Question and answer: Parallel sessions 3

(MS 17) Thermal Processes, Thermal Coupling and Thermal Properties of Porous Media: modeling and experiments at different scales – Part 1

**Q&A 7 10:05 – 11:00 - Chairs: Ruina Xu, Moran Wang**

[456] Numerical Analysis of Interaction between a Reacting Fluid and a Moving Bed with Spatially and Temporally Fluctuating Porosity *Alban Rousset; Abdoul Wahid Mainassara Chekaraou; Xavier Besseron; Bernhard Peters; Chiara Galletti*

[1196] Influence of the porous network on the conductive-radiative behavior of SiC-based cellular ceramics up to very high temperature *Benoit Rousseau; Jerome Vicente; Afeef Badri; Yann Favennec*

[724] Thermal Conduction Simulation Based on Reconstructed Digital Rocks with Respect to Fractures *Haiyuan Yang; Yongfei Yang; Jun Yao*

[857] Buoyancy-induced flow and heat transfer through and around a porous cylinder in a cavity *Shimin Yu; Tingting Tang; Jianhui Li; Peng Yu*

[872] Unsteady mixed convection flow through and around an array of cylinders *Tingting Tang; Shimin Yu; Jianhui Li; Peng Yu*

[1116] Analysis of Viscous Fingering for Steam Flooding Heavy Oil Reservoirs *Xue Liu; Jing Huang; Xiangyun Qu; Ming Li; Ming Jiang; Xianming Kou; Enshun Ouyang*
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(61) Dynamic of ice lens formation in frozen soil.
   Signe Kjelstrup; Seyed Ali Ghoreishian Amiri; Hao Gao; Gustav Grimstad; Benoit Loranger

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| [61] Dynamic of ice lens formation in frozen soil. 
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(6-A) Physics of multi-phase flow in diverse porous media– Part 2

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| [540] Insights into Laws of Topology in Wetting 
   Chenhao Sun; James McClure; Peyman Mostaghimi; Anna Herring; Steffen Berg; Ryan Armstrong |
| [1311] Pore scale observations of wetting alteration during low salinity water flooding 
   Edward Andrews; Sam Krevor; Ann Muggeridge |
| [885] Quantifying Wettability Alteration Effects on Fluid Flow Properties of Heterogeneous Porous Media 
   Omar Al-Farisi; Kamel Zahaf; Djamel Ouzzane; Mohamed Sassi |
| [406] Upscaling of capillary force in simultaneous infiltration of two immiscible fluids through porous media: pore scale LBM modelling 
   Zi Li; Sergio Galindo-Torres; Ling Li |
| [1236] Heterogeneity and mixed wetting states imaged during two-phase flow in carbonate rocks using X-ray tomography at high resolution and large fields of view 
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| [1335] Transition from micro-scale to macro-scale modeling of solute transport in drying porous media 
   Faeez Ahmad; Rahimi Arman; Evangelos Tsotsas; Marc Prat; Abdolreza Kharaghani |
| [1210] Pore-by-pore wettability characterization in sandstone and carbonate rocks 
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Question and answer: Parallel sessions 3 (cont.)

(MS 14) Physics of multi-phase flow in diverse porous media – Part 1

Q&A 9 14:35 – 15:30 - Chairs: Shuyu Sun, Hui Zhao

[126] Optimal Dispatch Techniques for Natural Gas Industry - Reservoir Simulation and Data Simulation.
Tao Zhang; Yiteng Li; Shuyu Sun; Hua Bai

Tao Zhang; Jie Chen; Shuyu Sun;

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[1015] DoE*-based history matching as a method for uncertainty quantification in THM(C) models of clay.
Jörg Buchwald; Olaf Kolditz; Sabine Attinger; Thomas Nagel

(MS 18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers – Part 1

Q&A 10 15:35 – 16:30 - Chairs: Christos Tsakiroglou, Olga Vizika

[1081] A True-to-Mechanism Model for Plasma and Transport Phenomena inside a DBD reactor
Nadia Bali; Christos Aggelopoulos; Eugenios Skouras; Christos Tsakiroglou; Vasilios Burganos

[1295] Simulating microscale zero-valent iron injection in field-like conditions: large-scale radial laboratory experiments and numerical modeling
Federico Mondino; Amelia Piscitello; Carlo Blanco; Andrea Gallo; Tiziana Tosco; Rajandrea Sethi

[577] Remediation of solid wastes by nanosecond pulsed dielectric barrier discharge plasma
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<td>Micro-Scale Mechanism Analysis of NAPL Contamination Remediation in Heterogeneous Porous Media</td>
<td>Xiaopu Wang; Xu Wang; Yan Li</td>
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</tbody>
</table>
Question and answer: Parallel sessions 3 (cont.)

(MS 17) Thermal Processes, Thermal Coupling and Thermal Properties of Porous Media: modeling and experiments at different scales – Part 1

Q&A 12 19:00 – 19:55 - Chairs: Bernhard Krooss, Yingfang Zhou


[1208] Experimental Study on the Performance of a Hybrid Evaporator Wick with Bionic Topological Substrate. Xin Cheng; Jingyi Wu; Guang Yang

[310] Evaporative cooling in fuel cells: Estimating effective conductivity in gas diffusion layers. Sarah van Rooij; Mirco Magnini; Sophia Haussener

[80] Numerical and semi-analytical investigation on forced convection in tubes fully/partially filled with metal foams. Farshid Jamshidi; Anastasia August; Andreas Reiter; Aron Kneer; Michael Selzer; Britta Nestler

[202] Numerical modeling of coupled heat and water transport for the study of permafrost dynamics: High Performance Computing simulations for watershed scale analysis. Laurent Orgogozo; Oleg S. Pokrovsky; Christophe Grenier; Emmanuel Mouche; Manuel Marcoux; Michel Quintard

[787] Flow of sub- and supercritical CO2 in nano-porous ceramics: direct comparison of laboratory experiments and numerical simulation. Steffen Nolte; Yue Wang; Reinhard Fink; Bernhard M. Krooss; Moran Wang; Alexandra Amann-Hildenbrand

[959] Impact of moisture transfer in the context of borehole thermal energy storage application. Haibing Shao; Boyan Meng; Bo Wang; Sebastian Bauer; Olaf Kolditz

[1134] Non-classical hygrothermoelastic response of a hollow cylinder. Zhangna Xue

(MS 14) Physics of multi-phase flow in diverse porous media– Part 2

Q&A 13 20:00 – 20:55 - Chairs: Shuyu Sun, Morris Flynn

[223] Dealing with Model Uncertainty and Deficiencies in Thermal Breakthrough Models. Elvar K. Bjarkason; Anna Suzuki

[1173] Local and global sensitivity analysis of THM consolidation around a point heat source. Aqeel Afzal Chaudhry; Jörg Buchwald; Thomas Nagel
### Q&A 13 20:00 – 20:55 - **Chairs:** Shuyu Sun, Morris Flynn

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<tr>
<th>Paper Number</th>
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<tr>
<td>[1308]</td>
<td>A novel molecular communication paradigm for porous media applications.</td>
<td>Matteo Icardi; John Couch</td>
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<td>[1195]</td>
<td>Quality assessment and parameter estimation of post-laminar flow models.</td>
<td>Mohaddeseh Mousavi Nezhad; Alberto Guadagnini</td>
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<td>[1284]</td>
<td>Quantifying uncertainty using Monte Carlo method in methane hydrate reservoir simulations.</td>
<td>Neelam Choudhary; Jyoti Phirani</td>
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<td>[1229]</td>
<td>Application of Discrete Fracture Network Modeling using Sequential Gaussian Simulation.</td>
<td>Timur Merembayev; Yerlan Amanbek; Sanjay Srinivasan</td>
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<td>[739]</td>
<td>Evaluating influence factors on phase equilibria calculation of CO2/H2O mixture using the CPA equation of state.</td>
<td>Yiteng Li; Tao Zhang; Shuyu Sun</td>
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<td>[663]</td>
<td>Reduced-Physics Multilevel Monte Carlo Methods for Uncertainty Quantification in Complex Reservoirs.</td>
<td>Øystein Klemetsdal; Stein Krogstad; Knut-Andreas Lie</td>
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Bernd Flemisch
University of Stuttgart

Facilitating the Reproduction of Simulation Results

Guaranteeing the reproducibility of simulation results faces many technical challenges, mostly originating from complex software stacks and hardware architectures. In this talk, we present our measures for facilitating the reproduction of simulation results obtained with the open-source porous-media simulator Dumux. In particular, we would like to automate the steps from a local executable to a distributable web application with which the results can be reproduced and visualized. This includes the containerization of the underlying software stack, access to the required input data, selection and provision of a suitable backend, as well as the generation of the browser frontend. The current state of our efforts is illustrated by means of a recently performed benchmark study for flow and transport in fractured porous media.
Invited Speakers: Parallel Session 3 (cont.)
14:00 - 14:30 CET

Lilit Yeghiazarian
University of Cincinnati

**HydroGrid: Emerging Technologies for Global Water Quality and Sustainability**

Water problems cannot be solved piece-meal, one issue at a time. Rather, a holistic, systems-based approach is needed to manage the global water system sustainably. This talk will introduce the concept of the HydroGrid as a framework to describe connected water systems that encompass surface water and groundwater, the natural environment and built infrastructure. Drawing upon the knowledge and engineering experience employed in electrical grid operations, we outline mirroring concepts in the HydroGrid, with a particular focus on monitoring, analysis, and control of water quality.

We will discuss emerging technologies in advanced materials, porous media design and modeling, signal transduction and wireless communications that enable development of autonomous mobile devices for dynamic water quality monitoring. As this technology matures, the devices will have the capability to stream real-time or near-real-time data for analysis with stochastic models of contaminant fate and transport. Modeling results, combined with controllability analysis of water systems, can then be used to determine system-wide prevention and mitigation strategies. Progress is measured with probability-based metrics of HydroGrid sustainability such as reliability, vulnerability, and resilience.
Career Development Event
17:00 - 18:00 CET

One of the most common struggles for a PhD student is to decide which career path to follow after graduate school. There are numerous opportunities that are potentially open to us as PhDs, which can take us on very different career paths. There are likely many questions you have about picking a direction (industry/academia/government) and the pros and cons of the various possibilities. A good approach to making an informed decision is listening to experiences and personal views of established professionals. The SAC’s career event will have speakers from varied backgrounds, sharing their professional journeys and the important choices they had to make along the way. You will also have the chance to ask the speakers any questions you have!

This event is free and open to all participants of InterPore2020!

Tiina Roose
Professor
University of Southampton.

Benoit Noetinger
OGST Editor
FP Energies Nouvelles

Veerle Cnudde
Professor
Ghent University
Scientific Writing Seminar
18:00 - 19:00 CET

How to write a successful research paper: The 10 mistakes to avoid

Jaime Gómez-Hernández will be offering this writing workshop, which is free and open to all participants of InterPore2020. Through a number of real cases, the attendants will learn the common mistakes made when submitting a manuscript for consideration to a specialized journal.

Jaime has served in the Editorial Boards of Journal of Hydrology, Journal of Hydrogeology and Mathematical Geology for many years, and currently, he is still a member of the boards of Advances in Water Resources, Mathematical Geosciences, Water, and Springer Nature Applied Science. He has rejected too many manuscripts in the last 20 years and can tell you what to do to avoid rejection. He will also discuss how to deal with non-scientific reviews, and what to do when you know that the review is incorrect.

Everything will be presented using examples based on actual submissions in a very casual and lively way. Many previous attendants to this seminar have been able to overcome the hurdle of the dreaded rejection letter.

*This seminar will also be held live during Time Block A on Wednesday.*
Fred Vermolen
University of Hasselt and TU Delft

**Modelling the behaviour of skin after deep tissue injury using poro- and morpho-elastic models**

More than 12 million people per year get seriously injured as a result of burn accidents. About one million people per year die as a result of the consequences. Serious skin trauma is often accompanied with heavy scar formation and with the formation of contractures, which refer to skin contractions that are so severe that the patient is faced with disability.

In order to improve the quality of life of patients, it is important to investigate the biological mechanisms behind the evolution of skin. Investigation of skin is done by clinical and in-vitro experiments, and by the formulation of hypotheses. To match theory to experiments, which come in as patterns and numbers, quantification of the developed theory is crucially important. Therefore, mathematical models help develop insight into the behaviour of skin after skin trauma.

Skin mechanics is an important aspect of the formation of contraction. One of the important features is that deformations are plastic. In this talk, a morpho-elastic model will be presented, as well as the underlying mathematical and numerical issues to simulate skin mechanics. Furthermore, some results from poro-elasticity will be discussed.

Since there are large patient-to-patient variations, uncertainty is an important aspect. In the talk, uncertainty aspects will also be dealt with using stochastic (partial) differential equations and stochastic processes.
Martin Vohralík
Inria Paris

A posteriori error estimates and adaptive solvers for porous media flows

Numerical simulation of porous media flows is a domain of permanently increasing importance. But can we assess how large is the error between the predicted numerical result and the unknown solution? And could the same precision be achieved faster? I will present some answers to these questions for several model porous media flow problems, starting from the steady linear single-phase Darcy flow, passing through problems involving reaction, advection, nonlinearities, degeneracies, or thermal effects, and ending with multi-phase multi-compositional flows with phase change. Guaranteed and fully computable bounds are obtained for the simpler problems, both for error in some energy norm or for error in a quantity of interest. A unified framework covering common discretization schemes (finite elements, finite volumes, discontinuous Galerkin) is presented, general polygonal/polyhedral meshes are discussed, and cheap implementations of the estimates are addressed. For all models, different error components are distinguished such as space discretization, time discretization, linearization, or algebraic. Then adaptive stopping and balancing criteria are designed which allow to invest the computational effort where needed and considerably speed-up simulations for the given relative precision target.
Scientific Writing Seminar
10:30 - 11:30 CET

How to write a successful research paper: The 10 mistakes to avoid

Jaime Gómez-Hernández will be offering this writing workshop, which is free and open to all participants of InterPore2020. Through a number of real cases, the attendants will learn the common mistakes made when submitting a manuscript for consideration to a specialized journal.

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Everything will be presented using examples based on actual submissions in a very casual and lively way. Many previous attendants to this seminar have been able to overcome the hurdle of the dreaded rejection letter.

*This seminar will also be held live during Time Block C on Tuesday.
**Timing of Q&A sessions on Wednesday**

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<th>Time Block (CET)</th>
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<td>A (09:35 – 10:30)</td>
<td>Q&amp;A 14</td>
<td>MS6-A, part 4</td>
<td>MS2</td>
<td>MS12, part 1</td>
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<td>A (10:35 – 11:30)</td>
<td>Q&amp;A 15</td>
<td>MS6-A, part 5</td>
<td>MS15, part 1</td>
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<td>B (14:35 – 15:30)</td>
<td>Q&amp;A 16</td>
<td>MS6-A, part 6</td>
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<td>B (15:35 – 16:30)</td>
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<td>MS6-A, part 7</td>
<td>MS15, part 2</td>
<td>MS23, part 2</td>
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<td>C (19:05 – 20:00)</td>
<td>Q&amp;A 18</td>
<td>MS9, part 1</td>
<td>MS6-B, part 1</td>
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<td>C (20:05 – 21:00)</td>
<td>Q&amp;A 19</td>
<td>MS9, part 2</td>
<td>MS15, part 3</td>
<td>MS10, part 3</td>
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**Question and answer: Parallel sessions 1**

(Phase 6-A) Physics of multi-phase flow in diverse porous media - Part 4

**Q&A 14 09:35 – 10:30 - Chairs: Ryan Armstrong, Tannaz Pak**

- [801] Gas Slippage in Partially Saturated Tight Rocks
  Steffen Nolte; Mohammadrehabb Shabani; Reinhard Fink; Bernhard M. Krooss; Alexandra Amann-Hildenbrand

  Dongxing Du; Yinjie Shen; Di Zhao; Weifeng Lv; Ninghong Jia; Tong Li; Yingge Li

- [1230] Study on multi-phase seepage of complex pore network in strongly heterogeneous carbonate reservoir based on various methods: A case study in Upper Cretaceous Khasib of the E Oilfield in the Middle East
  Hao Lu; Hongming Tang; Yijun Wang

- [199] Study on micro seepage model of nanopore in shale gas reservoir considering diffusion and slippage effect.
  Lijuan Jiang; Hongguang Sun

- [1214] Mechanism study on water plugging and EOR by nitrogen foam injection in bottom-water reservoirs
  Danqi Chen; Binfei Li; Zhengxiao Xu; Kun Liu; Huiyu Yang; Zheyang Liao

- [700] Experimental study on enhanced oil recovery of offshore heavy oil reservoirs by activated water flooding
  Xin Chen; Yiqiang Li; Mingyue Sui; Jian Zhang; Han Zhang

- [589] Measurement and Research of Two-phase Micro-force of Foam Fluid and Heavy Oil
  Zihan Gu; Zhaomin Li; Teng Lu; Zhengxiao Xu; Sheng Li; Xinru Zhao
Question and answer: Parallel sessions 1 (cont.)

(MS 6-A) Physics of multi-phase flow in diverse porous media– Part 5 (cont.)

Q&A 15 10:35 – 11:30 - Chairs: Ryan Armstrong, Holger Ott

[1250] Effect of the deformation and variability of biosourced reinforcement mats on their permeability
Tarek Abdul Ghafour; Chiara Balbinot; Nils Audry; Florian Martoia; Laurent Orgéas; Pierre J.J. Dumont

[358] Electrolyte Transport through the Porous Electrode in Vanadium Redox Flow Batteries
Nico Bevilacqua; László Eifert; Kerstin Köble; Rupak Banerjee; Tomas Farago; Marcus Zuber; Aimy Bazylak; Roswitha Zeis

[1299] Insights on transition from capillary toward viscous flow in porous media
Mahdi Mansouri-Boroujeni; Mohamed Azaroual; Sophie Roman

[1245] Modeling the effect of microscale heterogeneities on soil bacterial dynamics and the impact on soil functions.
Simon Zech; Alexander Prechtel; Nadja Ray

[572] Control of immiscible displacement patterns in disordered porous media
Xinlei Qi; Zhengyuan Luo; Bofeng Bai

[628] Pore Scale Mechanisms of Chemical Injection into Heterogeneous Micromodel
Dongqing Cao; Ming Han; Jinxun Wang; Abdulkareem AlSofi

[300] Experimental study of CO2/CH4 diffusion coefficient in oil-saturated cores under reservoir conditions
Zerong Li; Yi Zhang

[1281] Meter-scale core floods and 3D numerical modelling to study the interplay between immiscible viscous fingering and geological heterogeneity
Samuel Jackson; Mojtaba Seyyedi; Michael Clennell

(MS 6-A) Physics of multi-phase flow in diverse porous media– Part 6

Q&A 16 14:35 – 15:30 - Chairs: Yaniv Edery, Tannaz Pak

[122] Pore-scale imaging of multiphase flow in porous media: wettability, minimal surfaces, displacement efficiency
Qingyang Lin; Branko Bijeljic; Sam Krevor; Steffen Berg; Martin Blunt

[214] Effect of Wetting Transition during Multiphase Displacement in Porous Media
Zhongzheng Wang; Jean-Michel Pereira; Yixiang Gan

[1159] Real-time imaging reveals distinct pore scale dynamics during transient and equilibrium subsurface multiphase flow
Catherine Spurin; Sam Krevor; Martin Blunt; Steffen Berg; Gaetano Garfi; Maja Ruecker; Tom Bultreys; Vladimir Novak; Christian Schleputz
Question and answer: Parallel sessions 1 (cont.)

(MS 6-A) Physics of multi-phase flow in diverse porous media– Part 6 (cont.)

Q&A 16 14:35 – 15:30 - Chairs: Yaniv Edery, Tannaz Pak

[1217] Characterization and 3D numerical modelling of multiphase flow in Carbonate rocks
Nele Wenck; Sam Krevor; Samuel Jackson; Ann Muggeridge; Sojwal Manoorkar; Alistair Jones

[1242] The Impact of Entrapped Air on Satiated Hydraulic Conductivity of Coarse Sands Interpreted by X-ray Microtomography
Tomas Princ; Helena M.R. Fideles; Johannes Koestel; Michal Snehota

[520] Pore-scale study of spontaneous imbibition in digital rock by using a color-gradient lattice Boltzmann model
Yang Liu; Jianchao Cai; Qingbang Meng; Xuan Qin; Shanshan Jiang

[876] Gravity-driven fluid slug splitting at T-junctions: visual experiments and a novel model
Zhibing Yang; Song Xue; Yi-Feng Chen

Julien Maes; Cyprien Soulaine; Sebastian Geiger

(MS 6-A) Physics of multi-phase flow in diverse porous media– Part 7

Q&A 17 15:35 – 16:30 - Chairs: Yaniv Edery, Saman Aryana

[565] Compositional pore network model for gas condensate flow
Paula Reis; Marcio Carvalho

[1179] Upscaled equations for two-phase flow in highly heterogeneous porous media
Tufan Ghosh; Carina Bringedal; Rainer Helmig; G. P. Raja Sekhar

[965] Relative magnitude of capillary over bulk viscosity resistances for NWP blobs flowing within periodic capillary tubes
Marios Valavanides; Santanu Sinha; Alex Hansen

[355] Pore-scale wettability characterization in mixed-wet sandstones using dynamic laboratory micro X-ray tomography
Arjen Mascini; Marijn Boone; Veerle Cnudde; Tom Bultreys

[1288] The effect of solution gas liberation on oil flow in the porous medium
Wael Al-Masri; Alexander Shapiro

[1051] Study on formation water mobility and its determination method in tight sandstone gas reservoirs
Dongsheng Li; Yuliang Su; lei li; Xiaogang Gao; Jingang Fu

[1175] Investigating the effect of SIO2 nano particles on interfacial tension as EOR indicator.
Ali Alsaffar; Abbas Abubakar

[1341] Asymptotic analysis of immiscible two-phase flow with moving contact line in a thin strip.
Carina Bringedal; Stephan Lunowa; Iuliu Sorin Pop
The Paris Agreement has sent a signal around the world: climate change is a serious issue that governments are determined to address. By 2070 there is the potential for a very different energy system to emerge. It can be a system that brings modern energy to everyone in the world, without delivering a climate legacy that society cannot readily adapt to. That is the essence of the Sky scenario.

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### Question and answer: Parallel sessions 1 (cont.)

**Q&A 18 19:05 – 20:00 - Chairs: Martin Blunt, James McClure**

| [1258] Improving physics of residual trapping of CO2 in pore-network flow models using direct numerical simulation. | Amir Kohanpur; Albert Valocchi |
| [1254] Pore-network modeling of mineral dissolution and reactive transport in porous media. | Barbara Esteves; Paulo L.C. Lage; Paulo Couto; Anthony Kovscek |
| [274] Validating pore-scale modeling of fluid flow and mass transport in multi-scale porous media with microporosity | Bin Wang; Karsten Thompson; Richard Hughes; Lin Mu |
| [1234] Scale-effect in the simulation of two-phase flow in porous media | Brandon Yokeley; Behzad Ghanbarian; Muhammad Sahimi |
| [765] Lattice Boltzmann Modeling of the Apparent Viscosity of Thinning-Elastic Fluids in Porous Media | Chiyu Xie; Matthew Balhoff |
| [413] An analysis model for hydraulic fracturing liquid imbibition into shale matrix: coupling molecular interactions and dynamic contact angle | Han Wang; Yuliang Su; Wendong Wang |
| [1296] Unfitted boundary method to improve mesh convergence of high-resolution CT-scan permeability | Martin Lesueur; Hadrien Rattez; Oriol Colomés |
| [1329] Pore-scale CFD based estimation of permeability decline in porous media due to fines migration | Pramod Bhuvankar; Abdullah Cihan; Jens Birkholzer |

### Question and answer: Parallel sessions 2 (cont.)

**Q&A 19 20:05 – 21:00 - Chairs: Martin Blunt, James McClure**

| [1185] Effect of metal foam geometric characteristics on its permeability in non-Darcy flow regime: A Pore-scale direct numerical simulation study. | Hamid Moghimi; Majid Siavashi |
| [186] Analysis of capillary imbibition for fluid through confined Nano pores | Fanhui Zeng; Qiang Zhang; Jianchun Guo; Yu Zhang |
| [688] Evaluation of Equivalent Permeability in 3D Vuggy Porous Media using Brinkman Model and Digital Image Analysis | Rafael Cruz; Marcio Carvalho; Frederico Carvalho |
| [975] Expanding the role of pore-scale models to capture the multi-scale evolution of porous media | Sergi Molins; Hang Deng; David Trebotich; Carl Steefel |
| [1239] Fully-implicit dynamic pore-network modeling of two-phase flow in porous media | Sidian Chen; Chaozhong Qin; Bo Guo |
Question and answer: Parallel sessions 1 (cont.)

**MS 9** Pore-scale modelling – Part 2 (cont.)

**Q&A 19** 20:05 – 21:00 - **Chairs**: Martin Blunt, James McClure

- [1312] A new generation of lattice Boltzmann code for pore-scale simulation of scCO2-brine displacement in complex geometries
  - Yu Chen; Qinjun Kang; Albert Valocchi; Hari Viswanathan

- [1201] Numerical Analysis of a Model of Biofilm Growth at the Pore-Scale
  - Azhar Alhammali; Malgorzata Peszynska

- [1163] Modeling the droplet occurrence, growth and detachment at the interface between the porous layers in a PEM fuel cell coupling a pore-network model with Stokes flow
  - Cynthia Michalkowski; Maziar Veyskarami; Carina Bringedal; Rainer Helmig

Question and answer: Parallel sessions 2

**MS 2** Porous Media for a Green World: Water & Agriculture

**Q&A 14** 09:35 – 10:30 - **Chairs**: Joaquín Jimenez-Martínez, Jan Vanderborght, Jun Yin

- [960] Structured Mini-Dunes (SMDs) as Self-Irrigation Units: A Lesson from the Sand Dunes of Arid Regions.
  - Afrah Al-Shukaili; Ali Al-Maktoumi; Anvar Kacimov

  - Ahmed Al-Mayahi; Said Al-Ismaily; Ali Al-Maktoumi; Hamed Al-Busaidi; Anvar Kacimov; Rhonda Janke; Johan Bouma; Jirka Šimůnek;

- [1336] Global scale prediction of long-term variations of soil salinity and sodicity.
  - Amirhossein Hassani; Adisa Azapagic; Nima Shokri

- [83] Tracing back the source of contamination.
  - J. Jaime Gómez-Hernández; Zi Chen; Andrea Zanini

  - Monica Granetto; Lucia Re; Carlo Bianco; Aurora Audino; Luca Serpella; Francesco Vidotto; Silvia Fogliatto; Tiziana Tosco

- [964] Nanoporous carbon scaffolds for membrane filtration and capacitive deionization applications.
  - Arlene (Chengying) Ai; Xiaoan Li; Robert Mayall; Sathish Ponnurangam; Viola Birss

- [136] Hydraulic behaviour of sand-biochar mixtures: Particle size effects on permeability.
  - Ziheng Wang; Majid Sedighi; Amanda Lea-Langton

- [208] The effect of salinity on fecal bacteria transport through porous media.
  - Dong Zhang; Valentina Prigioabbe
Question and answer: Parallel sessions 2 (cont.)

(MS 2) Porous Media for a Green World: Water & Agriculture (cont.)

**Q&A 14 09:35 – 10:30 - Chairs: Joaquín Jimenez-Martínez, Jan Vanderborght, Jun Yin**

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<td>Jingwen Wang; Weian Huang; Yu Fan; Bo Zeng; Haoyong Huang</td>
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(MS 15) Machine Learning and Big Data in Porous Media – Part 1

**Q&A 15 10:35 – 11:30 - Chairs: Denis Voskov, Kai Zhang**

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<th>[236] Evaluation of machine learning methods for predicting the oil-water relative permeability: a comparison of tuning processes and model performances</th>
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<td>Baosheng Jiang; Zhixue Sun</td>
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<th>[668] Data-driven models based on flow diagnostic and machine learning techniques</th>
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<td>Manuel Borregales; Stein Krogstad; Knut-Andreas Lie</td>
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<th>[1098] Predicting Performance of Offshore Oilfield in High Water Cut Period Based on Big Data and Artificial Intelligence</th>
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<td>Cunliang Chen; Hongyou Zhang; Shaopeng Wang; Yu Wang; Qiongyuan Wu; Xue Liu</td>
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<th>[1168] Optimization of fracturing parameters in shale gas reservoir by a modified variable-length particle swarm optimization algorithm</th>
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<td>Zhihao Li; Jun Yao</td>
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<th>[298] Flux Regression Neural Networks for Backbone Identification in Discrete Fracture Networks</th>
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<td>Stefano Berrone; Francesco Della Santa; Antonio Mastropietro; Sandra Pieraccini; Francesco Vaccarino</td>
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<tr>
<th>[764] Analysis of Neural Networks Performances for Flux Regression in Discrete Fracture Networks</th>
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<th>[514] Predicting the effective thermal conductivities of sands using machine learning and a thermal conductance network model</th>
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<td>Wenbin Fei; Guillermo Narsilio</td>
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<td>Xuliang Liu; Daolun Li; Jinghai Yang; Wenshu Zha</td>
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Biochemical processes and biofilms in porous media

Q&A 16 14:35 – 15:30 - Chairs: Anozie Ebigbo, Secchi Eleonora

[621] Experimental Methods and Imaging for Enzymatically Induced Calcite Precipitation in micro-fluidic devices.
Felix Weinhardt; Johannes Hommel; Robin Gerlach; Nikolaos Karadimitriou; Holger Steeb; Holger Class Dongwon Lee; Samaneh Vahid Dastjerdi

[967] Pore-scale simulations of hydraulic properties during biomass accumulation.
Holger Ott; Neda Hassannayebi; Frieder Enzmann; Johanna Schritter; Martin Ferno; Andreas Paul Loibner

[620] A Numerical Model for Enzymatically Induced Calcite Precipitation.
Johannes Hommel; Arda Akyel; Adrienne Phillips; Robin Gerlach; Al Cunningham; Holger Class

[562] Numerical simulations of biofilms in core samples: MEOR and MICP.
David Landa Marbán; Gunhild Bødtker; Bartek Florcsyk Vik; Per Pettersson; Iuliu Sorin Pop; Kundan Kumar; Florin Adrian Radu; Svenn Tveit; Sarah Gasda

[989] Field trials on Microbially Induced Desaturation and Precipitation for liquefaction mitigation.
Leon van Paassen; Chen Zeng; Caitlyn Hall; Elizabeth Stallings Young; Diane Moug; Arash Khosravifar

[1152] Life in a tight spot: Bacterial motility in porous media.
Tapomoy Bhattacharjee; Daniel Amchin; Jenna Ott; Felix Kratz; Sujit Datta

Beibei Gao; Ehsan Taghizadeh; Brian Wood; Roseanne Ford

[1298] How does microbial calcite precipitation alter soil water retention characteristics?
Ehsan Nikooee; Rahim Saffari; Ghassem Habibagahi; Martinus van Genuchten

[1248] Modelling biofilm formation in porous media flow.
Christoph Lohrmann; Kartik Jain; Christian Holm

Machine Learning and Big Data in Porous Media – Part 2

Q&A 17 15:35 – 16:30 - Chairs: Bailian Chen, Jianchun Xu

[730] A Physics-based Data-driven Model for Waterflooding Profile Control and Water Plugging Performance
Hui Zhao; Wei Liu; Shuoliang Wang; Lin Cao; Yuhui Zhou

Xiaopeng Ma; Kai Zhang
Question and answer: Parallel sessions 2 (cont.)

(MS 15) Machine Learning and Big Data in Porous Media – Part 2 (cont.)

**Q&A 17 15:35 – 16:30 - Chairs: Bailian Chen, Jianchun Xu**

[682] Equivalent Permeability Prediction of Karst Core Samples Using Deep Learning
Monique Dalí; Sergio Ribeiro; Frederico Gomes; Marcio Carvalho

[868] Properties Quantification of Heterogeneous Media with 3D Vision informed Machine Learning
Omar Al-Farisi; Aikifa Raza; Hongtao Zhang; Djamal Ouzzane; Mohamed Sassi; Tiejiong Zhang

Qiaonan Li; Weifeng Liu

[611] Research on Prediction of Remaining Oil Distribution Based on SVM and LSTM
Gujian Wei; Yanlong Ren

[1215] Shale gas productivity prediction and parameter optimization based on machine learning.
Lu Qiao; Shuangfang Lu; Huijun Wang; Zheng Fu; Taohua He

[1263] Lithology classification on rock samples microtomographic images using artificial intelligence.
Adna Grazielly Paz de Vasconcelos; Manuel Ramon; Vargas Avila

(MS 6-B) Interfacial phenomena in multiphase systems – Part 1

**Q&A 18 19:05 – 20:00 - Chairs: Pacelli Zitha, Yashar Mehmani**

Grigori Chapiro; Luis Fernando Lozano; Rosmery Zavala; Pacelli Zitha

[1044] Uncertainty quantification in a model for foam flooding in porous media.
Rodrigo Weber dos Santos; Andrés R. Valdez; Bernardo Martins Rocha; Grigori Chapiro

[684] Applications of the electromagnetic heating in EOR.
Samuel Almeida; Grigori Chapiro; Pacelli Zitha

Yu Qiu; Ke Xu

[690] Polymer Screening Using Microfluidics.
Mohammad Zargartalebi; Anne Benneker

[777] Effects of Salinity and N-, S-, and O-Bearing Polar Components on Light Oil-Brine Interfacial Properties from Molecular Perspectives.
Wenhui Li; Zhehui Jin

Fabian Torres Mendez; Martijn Janssen
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Question and answer: Parallel sessions 2 (cont.)

(MS 6-B) Interfacial phenomena in multiphase systems – Part 1(cont.)

Q&A 18 19:05 – 20:00 - Chairs: Pacelli Zitha, Yashar Mehmani

[567] Probing Chemical Interactions of Asphaltenes with Silica and Calcium Carbonate Surfaces.
Saleh Hassan; Maxim Yutkin; Sirisha Kamireddy; Xiaozhen Hu; Clayton Radke; Tadeusz Patzek

(MS 15) Machine Learning and Big Data in Porous Media – Part 3

Q&A 19 20:05 – 21:00 - Chairs: Bailian Chen, Bo Guo

[1189] A novel approach to identify hydraulic conductivity fields that best approximate geological uncertainties via unsupervised learning techniques and Wellhead Protection Area Analysis
Abelardo Rodríguez-Pretelín; Wolfgang Nowak

[1314] Estimating Oil Recovery Factor from Reservoir Characteristics using the XGBoost Algorithm
Alireza Roustazadeh; Behzad Ghanbarian; Mohammad Shadmand; Vahid Taslimitehrani; Larry Lake;

[73] Estimation of Subsurface Hydraulic Conductivities using Geophysical Signatures
Debasmita Misra; Peter Calvin

[697] Physics-informed machine learning of permeability prediction and upscaling of reactive transport in porous media
Hongkyu Yoon

[1003] Automation of flow simulation in porous media
Masa Prodanovic; Javier Santos; Honggeun Jo; Michael Pyrcz

[1272] Bayesian inference of poroelastic properties from induced seismicity data using an energy-based poromechanics model
Mina Karimi; Elizabeth S Cochran; Mehrdad Massoudi; Matteo Pozzi; Kaushik Dayal

[1221] A Hybrid-driven method to improve dynamical reservoir characterization
Vanessa Simoes; Horrrara Diógenes; Marianna Dantas; Patrick Machado

[1262] Petrophysical properties predictions using computerized tomographic images.
Adna Grazielly Paz de Vasconcelos; Carlos Eduardo Menezes dos Anjos
### Q&A 14 09:35 – 10:30 - Chairs: Alessio Fumagalli, Jianchao Cai

1. **Multi-scale Extended Finite Element Method For Fractured Geological Formations.** Fanxiang Xu, Hadi Hajibeygi, Bert Sluys

2. **Influence of reservoir heterogeneity on fracture propagation of true triaxial hydraulic fracturing.** Jin Wang, Jianwei Feng, Rongtao Jiang, Wenqing Tang, Ping Wang

3. **The influence of porosity and gas hydrate on tortuosity in porous media based on CT scanning - lattice Boltzmann method.** Lei Liu, Zhixue Sun

4. **Stress Field Change of Multi well and Multi period Fracturing and its Influence on Reservoir Development.** Rongtao Jiang, Jianwei Feng, Jin Wang

5. **A generalized finite volume method for density driven flows in porous media.** Yueyuan Gao, Danielle Hilhorst, Huy Cuong Vu Do

6. **The change of reservoir physical properties with formation pressure decreasing and its influence on remaining oil.** Jintao Wu, Yong Hu, Guangming Pan, Jianting Huang, Hao Li

7. **Poroelastic effects of CO2 adsorption capacity in coal seams under subsurface boundary conditions.** Yuxun Zhu, Jinfeng Liu, Peter Fokker

8. **The impact of surface roughness on contact angle hysteresis studied by molecular dynamics simulation.** Wei Yong, Yingfang Zhou, Jos J. Derksen

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### Q&A 15 10:35 – 11:30 - Chairs: Liwei Zhang, Nima Shokri

1. **Measuring contact angles in a two-phase flow experiment using home-laboratory micro-computed tomography.** Kim Robert Tekseth, Dag Werner Breiby

2. **Facilitating visualization and analysis of time-resolved X-ray micro-CT data using sliding widow reconstruction and flip point detection.** Marijn Boone, Jan Dewanckele, Arno Merkle, Tom Bultreys, Tim De Kock

3. **SEM, Raman and Micro-CT characterization of CO2-Induced Wellbore Cement degradation.** Yan Wang, Liwei Zhang, Xiuxiu Miao, Manguang Gan
### Question and answer: Parallel sessions 3 (cont.)

**Q&A 15 10:35 – 11:30 - Chairs: Liwei Zhang, Nima Shokri**

1. The influence of confining pressure and flow process on the corrosion of wellbore cement under geological storage environment.  
   **Manguang Gan; Liwei Zhang; Xiuxiu Miao; Yan Wang; Xiaochun Li**

   **Omid Shahrokhi; Amir Jahanbakhsh; M. Mercedes Maroto-Valer**

3. Distribution and Quantitively Evaluation of Micro Residual Oil after Polymer Flooding based on CT Scanning.  
   **Liu Tao; Yongfei Yang; Jun Yao; Lei Zhang; Hai Sun**

   **Huo Hongbo; Li Jinman; Ma Kuiqian; Hu Yong; Li Hongyuan**

5. A fractal analysis of stress sensitivity of a porous medium based on the thick-walled Cylinder Model.  
   **Xin Su; Zhaoqin Huang; Jun Yao**

### Question and answer: Parallel sessions 3 (cont.)

**Q&A 16 14:35 – 15:30 - Chairs: Sadaf Sobhani, Andreas Busch**

1. Multi-scale 3D/4D imaging of the pore network in shales and its evolution under subsurface conditions.  
   **Lin Ma; Kevin Taylor; Patrick Dowey; Michael Chandler; Peter Lee**

2. Dynamic in situ computed tomography study of strain evolution in Draupne shales under triaxial loading.  
   **Aldritt Scaria Madathiparambil; Basab Chattopadhyay; Nicolaine Agofack; Pierre Cerasi; Jessica Ann McBeck; Francois Renard; Alain Gibaud; Dag Werner Brieby**

3. Pore-scale imaging with measurement of relative permeability and capillary pressure on the same reservoir sandstone under water-wet and mixed-wet conditions.  
   **Ying Gao; Ali Q. Raeini; Ahmed Selem; Igor Bondino; Martin J. Blunt; Branko Bijeljic**

4. Porous system characterization of a heterogeneous carbonate rock bed using x-ray microtomography.  
   **Fernanda Hoerlle; William Godoy; Elizabeth May Pontedeiro; Paulo Couto**

5. Contrast enhanced X-ray micro-tomography of tomato fruit tissues for microscale gas transport simulation.  
   **Hui Xiao; Pieter Verboven; Agnese Piovesan; Bayu Nugraha; Bart Nicolai**

6. An experimental study of the interplay between viscous, capillary and gravitational forces in two-phase flow in a three-dimensional porous medium.  
   **Joachim Falck Brodin; Per Arne Rikvold; Marcel Moura; Knut Jorgen Maloy**
### Question and answer: Parallel sessions 3 (cont.)

(MS 10) Advances in imaging porous media: techniques, software and case studies – Part 2

**Q&A 16 14:35 – 15:30 - Chairs: Sadaf Sobhani, Andreas Busch**

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<th>[1022]</th>
<th>2D to 3D Transform: Material Properties from 2D Images.</th>
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<td><em>Juan Pablo Daza; Amos Nur; Tapan Mukerji</em></td>
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<td><em>Yixin Zhang; Rouzbeh Ghanbarnezhad Moghanloo; Davud Davudov</em></td>
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(MS 23) Special Session for Professor Rainer Helmig – Part 2

**Q&A 17 15:35 – 16:30 - Chairs: Bernd Flemisch, Martin Schneider**

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<th>[1300]</th>
<th>Component transport at the soil – atmosphere interface.</th>
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<td><em>Lisa Bahlmann; Insa Neuweiler</em></td>
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<td><em>Peter Knabner; Carina Bringedal; Florin Adrian Radu; Iuliu Sorin Pop; Lars von Wolff; Manuela Bastidas</em></td>
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<tr>
<th>[1174]</th>
<th>Precipitation and dissolution in complex media: modelling, upscaling and simulation.</th>
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<tr>
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<td><em>Manuela Bastidas; Carina Bringedal; Iuliu Sorin Pop; Florin Adrian Radu; Lars von Wolff</em></td>
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<tr>
<th>[1181]</th>
<th>Robust and efficient solvers for flow in deformable porous media.</th>
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<td><em>Florin Adrian Radu</em></td>
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<th>[719]</th>
<th>3D modelling of subsurface methane leakage through unconsolidated sedimentary aquifers; implications for environmental monitoring.</th>
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<td><em>Gilian Schout; S. Majid Hassanizadeh; Jasper Griffioen; Niels Hartog; Rainer Helmig</em></td>
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(MS 12) Advances in modeling and simulation of poromechanics – Part 2

**Q&A 18 19:05 – 20:00 - Chairs: Alessio Fumagalli, Florian Doster**

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<th>[54]</th>
<th>Dynamic hydraulic fracturing in naturally fractured reservoirs.</th>
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<td><em>Mohammad Vahab; Mohamadreza Hirmand; Nasser Khalili</em></td>
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<td><em>Ning Zhang; Cijia Wang; Thomas Nagel</em></td>
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<th>[1232]</th>
<th>A deformation-dependent permeability model for polycrystalline rocks.</th>
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<td><em>Florian Zill; Olaf Kolditz; Thomas Nagel</em></td>
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<td><em>Paiman Shafabakhsh; Marwan Fahs; Renaud Toussaint</em></td>
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<td><em>Didi Wu; Shuxia Li</em></td>
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Question and answer: Parallel sessions 3 (cont.)

(MS 12) Advances in modeling and simulation of poromechanics – Part 2

Q&A 18 19:05 – 20:00 - Chairs: Alessio Fumagalli, Florian Doster

Jintao Wu; Lei Zhang; Jianting Huang; Hao Li; Guangming Pan

Matthew Andrew

(MS 10) Advances in imaging porous media: techniques, software and case studies – Part 3

Q&A 19 20:05 – 21:00 - Chairs: Nikolaos K. Karadimitrio, Maja Rucker

Ahmed Hassan; Viswasanthi Chandra; Maxim Yutkin; Tadeusz Patzek

[1205] Time-lapse imaging of fines migration within subsurface reservoirs.
Chenzi Shi; Kevin G. Taylor; Lin Ma

[1218] A quantitative method to compare Invasion Percolation models to high-resolution gas-injection experiments in sand.
Ishani Banerjee; Anneli Guthke; Cole Van de Ven; Kevin G. Mumford; Wolfgang Nowak

[1197] Impact of image resolution on quantification of mineral properties and simulated mineral reactions and reaction rates.
Fang Qi; Lauren Beckingham

[1256] Study on the effect of pore structure in thermal conductivity and permeability of volcanic rocks.
Sandra Vega; Jonathan De la Rosa; Irving Reyna-Bustos

[212] Three-dimensional characterization of pore space architecture in granular materials.
Nimisha Roy; David Frost

[686] 3D Visualization of Oil Displacement by a Suspension of Microcapsules.
Raphael Chalhub Oliveira Spinelli Ribeiro; Marcio Carvalho

[937] Velocity Distribution Inside the Trapping Phase at Low Capillary Number: Direct Pore-Scale Modeling.
Amir Hossein Mohammadi Alamooti; Qumars Azizi; Hossein Davarzani
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James McClure  
Virginia Polytechnic Institute and State University

**Topology and its effects on fluid flow**

Geometric structure plays an essential role in many transport processes. Within this context, topology provides a way to measure how material is connected within a system. In a multiphase flow, topological changes occur due to coalescence and snap-off events that fundamentally alter the fluid structure and behavior. These changes can be understood quantitatively based on geometric invariants, which include the Euler characteristic as a topological measure. This talk will consider topological changes in the context of geometric evolution. Geometric laws that constrain the possible shapes that an object can attain will be used to infer the relationship between geometric invariants. Noting that changes to the topology of an object occur as discrete events, the fundamental mechanisms that drive these changes will be considered in detail. The associated physical consequences will be examined from the molecular scale, the pore-scale, and the reservoir scale.
Invited Speakers: Parallel Session 5 (cont.)
14:00 - 14:30 CET

Guang Yang
Shanghai Jiao Tong University

**Coupling free flow and porous-media flow, and its applications to aerospace and mechanical engineering**

The coupling of free flow and porous media flow is extensively involved in technical, environmental, and biological systems. In the first part of the talk, I will present the fundamental research with respect to the momentum transfer characteristics at the coupling interface. Then in the second part, I will talk about the roles of this coupling effect in three specific applications from the field of aerospace and mechanical engineering, namely vapor chamber heat-transfer system, transpiration cooling technology, and propellant acquisition device. The coupled free/porous media flows have also found to be often indivisible with turbulence, heat transfer, and phase change. Progress of the parameter optimization studies conducted by our group for the above mentioned applications will also be presented.
WEDNESDAY, 2 SEPTEMBER 2020
Time Block C

Award Ceremony
18:00 - 18:10 CET

Kimberly-Clark Distinguished Lectureship Award
Muhammad Sahimi
*University of Southern California, USA*

Secure your chance to host Prof. Muhammad Sahimi at your institute

Are you interested in hosting Muhammad Sahimi at your institution? InterPore Foundation accepts applications from member and non-member organizations for hosting the InterPore Kimberly-Clark Distinguished Lecturer. To request the presentation, please visit: [www.interpore.org/k-c-award](http://www.interpore.org/k-c-award). Download and fill out the application form and return it by e-mail. For further questions please contact: [executive-officer@interpore.org](mailto:executive-officer@interpore.org). Please be aware that the lecturer availability will be limited and not all requests can be honored by the lecturer.

A word of gratitude:
This award has been made possible by a generous grant from Kimberly-Clark, home to some of the world’s most iconic and trusted brands, including: Huggies, Scott, Kleenex, Cottonelle and Kotex. For more than a century Kimberly-Clark has been transforming insights and technologies into innovative products and services that improve the lives of nearly a quarter of the world’s population.
Qinjun Kang
Los Alamos National Lab

**Pore-Scale Direct Numerical Simulation of Flow and Transport in Energy and Environment**

Flow and transport processes in porous media are pervasive. A better understanding of these processes is critical for addressing important problems such as petroleum and geothermal energy production, geological storage of CO₂ and nuclear waste, as well as optimization of energy storage and conversion devices for improved performance. With the rapid advancement of computers and computational methods, and rapid development of X-ray tomographic imaging techniques that provide detailed pore structures for numerical simulation, pore-scale direct numerical simulation (DNS) of flow and transport in porous media has become increasingly popular. In this talk, I will present our recent work on pore-scale DNS of various flow and transport phenomena, including supercritical CO₂ displacing brine in a heterogeneous micromodel and real rock; oil and water two-phase flow in fractionally wet porous media; corrosion of uranium dioxide in a geological repository; multiphase multicomponent reactive transport during CO₂ dissolution trapping; as well as hydrocarbon behavior in nanopores of tight reservoirs. It is shown that pore-scale DNS can be a potentially powerful numerical tool to analyze flow and transport processes in various energy and environmental systems and can shed some light on the underlying physics occurring at the fundamental scale.
### Timing of Q&A sessions on Thursday

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<th>Time Block (CET)</th>
<th>Q&amp;A No.</th>
<th>Parallel sessions 1</th>
<th>Parallel sessions 2</th>
<th>Parallel sessions 3</th>
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<td>Q&amp;A 20</td>
<td>MS9, part 3</td>
<td>MS6-B, part 2</td>
<td>MS10, part 4</td>
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<td>A (10:00 – 10:55)</td>
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<td>Q&amp;A 23</td>
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<td>MS21 &amp; MS16</td>
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<td>B (15:00 – 15:55)</td>
<td>Q&amp;A 24</td>
<td>MS9, part 7</td>
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<td>Q&amp;A 25</td>
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**Question and answer: Parallel sessions 1**

**MS 9** Pore-scale modelling – Part 3

**Q&A 20 09:00 – 09:55 - Chairs: Martin Blunt, Stephane Zaleski**

- [701] Ion-Tuned Water - An Image-Based Pore-scale Study of Oil Recovery Improvement
  *Artur Shapoval; Yudong Yuan; Yuzhu Wang; Sheik Rahman*

- [85] Lattice Boltzmann simulation of amphiphilic fluids flow through porous media
  *Bei Wei; Jian Hou; Michael Sukop*

- [458] Lattice Boltzmann Simulations for micro-macro interactions during isothermal drying of porous media
  *Debashis Panda; Supriya B; Vikranth Kumar Surasani*

- [1039] An improved empirical model considering viscous coupling effect for hydraulic conductance of three-phase flow in pore network modeling
  *Fei Jiang; Jianhui Yang; Edo Boek; Takeshi Tsuji*

- [1191] Opalinus Clay experimental dataset with High Pressure Sorption, review and application to Pore Network Modelling
  *Georgy Borischev; Andreas Busch; Jingsheng Ma; Lin Ma*

- [986] Minkowski measure fields as basis for rock-typing and upscaling
  *Han Jiang; Christoph Arns*

- [618] Discrete Multiple Media Geological Modelling Method
  *Jiaxin Dong; Qiquan Ran; Wen Shi*

- [727] The construction of multi-scale multi-component pore network model with application in shale characterization
  *Ke Wang; Yongfei Yang; Jun Yao*

- [318] Wormholing and channelling: impact of heterogeneity on dissolution regimes in porous media using pore-scale direct numerical simulation.
  *Julien Maes; Hannah Menke; Alexandros Patsoukis Dimou; Sebastian Geiger*
(MS 9) Pore-scale modelling – Part 4

**Q&A 21 10:00 – 10:55 - Chairs: Martin Blunt, Stephane Zaleski**

[1176] Effects of pore-size disorder on forced imbibition in porous media
  *Lianwei Xiao; Guangpu Zhu; Jun Yao*

[1139] Using topology and energy balance to determine wettability in two and three-phase flow
  *Martin Blunt; Takashi Akai; Alessio Scanziani; Qingyang Lin; Abdulla Alhosani; Branko Bijeljic*

[228] Pore Scale Study of Solid/Liquid Phase Change in a 3D Cubic Lattice Metal Frame
  *Moghtada Mobedi; Chunyang Wang*

[1080] Complex interplay between wettability and pore geometry controlling dynamics of two phase flow in heterogeneous porous media
  *Sahar Bakhshian; Rabbani Harris; Seyyed Hosseini; Nima Shokri*

[215] A multi-scale diffuse interface/front tracking model for multi-component two-phase flow
  *Guangpu Zhu; Kou Jisheng; Yao Jun; Qianhong Yang*

[183] Thermal coupled reactive transport in porous media based on SPH method
  *Qianhong Yang; Jun Yao; Zhaoqin Huang*

[1017] Effective parameter identification via NMR experiment and simulation using multi-task Bayesian optimization
  *Rupeng Li; Igor Shikhov; Christoph Arns*

[645] Curvature Correction to Model Capillary Driven Flows at the Pore-Scale Using Volume-of-Fluid
  *Saideep Pavuluri; Julien Maes; Florian Doster*

(MS 9) Pore-scale modelling – Part 5

**Q&A 22 11:00 – 11:55 - Chairs: Martin Blunt, Stephane Zaleski**

[394] Numerical Modeling of Wettability Alteration in Porous Media Induced by Low Salinity Water
  *Takashi Akai; Martin Blunt; Branko Bijeljic*

[851] Pore scale disorder on tensile fracturing of porous medium using Lattice method simulation
  *WenXiang Tian; Gang Ma; Wei Zhou; Yao Liu; Lingxiao Chen*

[1076] Micro-CT image resolution limitation effects on NMR simulation response
  *Yinqzhi Cui; Igor Shikhov; Christoph Arns*

[407] Mesoscopic modelling of fluid-solid interaction and its effect on permeability estimation
  *Zi Li; Sergio Galindo-Torres; Ling Li*
## Q&A 22 11:00 – 11:55 - Chairs: Martin Blunt, Stephane Zaleski

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<th>[155]</th>
<th>Pore scale study of multiphase and multicomponent transport in methane hydrate bearing sediment</th>
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<td></td>
<td>Junyu Yang; Lin Shi; Zhiying Liu; Qianghui Xu; Cheng Zan</td>
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<td>Mohammad Masoudi; Hossein Fazeli; Rohaldin Miri; Helge Hellevang</td>
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<th>[670]</th>
<th>Investigation of salt-precipitation processes in porous-media systems at the pore scale</th>
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<td>Theresa Kurz; Rainer Helmig; Douglas Meisenheimer; Dorthe Wildenschild</td>
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<th>[441]</th>
<th>Pore-scale study of complex transport phenomena in porous media.</th>
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<td>Li Chen; Kang Qinjun; Wen-Quan Tao</td>
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## Q&A 23 14:00 – 14:55 - Chairs: Martin Blunt, James McClure

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<th>[1259]</th>
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<th>[466]</th>
<th>Quasi-3D pore-scale simulation of wettability heterogeneity in porous media</th>
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<td>Amir Jahanbakhsh; Omid Shahrokhi; M. Mercedes Maroto-Valer</td>
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<th>[873]</th>
<th>Capillary Pressure of Non-Wetting Ganglia in Porous Media: a Sub-Darcy Model</th>
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<td>Chuanxi Wang; Ke Xu</td>
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<th>[810]</th>
<th>The optimal wettability for oil recovery by waterflooding: dependence on structural factors</th>
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<td>Fanli Liu; Moran Wang</td>
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<tr>
<th>[1317]</th>
<th>Effect of grain-size distribution on the temporal evolution of interfacial area during multi-phase flow through porous media</th>
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<td></td>
<td>Fizza Zahid; Jeffrey A. Cunningham; Amy Stuart</td>
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<td>Juan Pablo Daza; Tapan Mukerji; Amos Nur</td>
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<tr>
<th>[1244]</th>
<th>Pore-scale flow with the memory-efficient Lattice Boltzmann formulation</th>
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<td></td>
<td>Maciej Matyka; Michał Dzikowski</td>
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<tr>
<th>[140]</th>
<th>Study of the effect of pore-scale mineral wettability alterations on the relative permeability curves</th>
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<tr>
<td></td>
<td>Ming Fan; James McClure; Ryan Armstrong; Mehdi Shabaninejad; Li Zhe; Laura Dalton; Dustin Crandall; Cheng Chen</td>
</tr>
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</table>
Question and answer: Parallel sessions 1 (cont.)

(MS 9) Pore-scale modelling – Part 7 (cont.)

Q&A 24 15:00 – 15:55 - Chairs: Martin Blunt, James McClure

[931] An interface-tracked dynamic network simulator for two-phase flow in porous media: recent developments and results
Santanu Sinha; Magnus Aa. Gjennestad; Morten Vassvik; Alex Hansen

[1289] Capillary bundle-Meter model for non-Newtonian fluid flow in porous media
Takshak Shende; Vahid J. Niasar; Masoud Babaei

[65] Capillary instabilities during two-phase flow process in a porous medium
Tao Zhang; Rui Wu

[1028] Contact line motion: comparing molecular dynamics, the phase field model and the sharp interface model
Ugis Lacis; Petter Johansson; Thomas Fullana; Stéphane Zaleski; Berk Hess; Gustav Amberg; Shervin Bagheri

[419] Lattice Boltzmann-pore network hybrid modelling of gas transport in nanoporous media
Wenhui Song; Maša Prodanović; Christopher J. Landry; Jun Yao

[1326] Pore network modeling of fuel cell catalyst layer performance
Amin Sadeghi; Shawn Litster; Jeff Gostick

[304] Tunable interactions during the discharge of a 2D silo.
Louison Thorens; Knut Jorgen Maloy; Mickaël Bourgoin; Stéphane Santucci

[1041] Gas separation in bent microchannel at low Reynolds number
Minh Tuan Ho; Jun Li; Wei Su; Lei Wu; Matthew Borg; Zhihui Li; Yonghao Zhang

(MS 9) Pore-scale modelling – Part 8

Q&A 25 16:00 – 16:55 - Chairs: Martin Blunt, James McClure

[913] Permeability prediction of fibrous porous media by the lattice Boltzmann method with a fluid-solid boundary reconstruction scheme
Suguru Ando; Masayuki Kaneda; Kazuhiko Suga

[979] Failure mechanism of kerogen by molecular dynamics simulations in relation to hydraulic fracturing in organic-rich shale
Tianhao Wu; Abbas Firoozabadi

[843] Pore Structure Characterization and Numerical Simulation of Electrical Conductivity for Tight Sandstone by Digital Rock Physics
Xuefeng Liu; Hao Ni; Jingxu Yan; Xiao Wei Zhang

[147] A unified multiple transport mechanism model for gas through shale pores
Fanhui Zeng; Yu Zhang; Jianchun Guo; Qiang Zhang; Wenxi Ren; Jianhua Xiang

[124] Pore-scale Simulation of Gas Flow in Microscopic Porous Media with Complex Geometries
Yuhang Wang; Saman Aryana

[1183] Reconstruction of Porous Media Based On Variational Autoencoders Method Using 2D Slice
Yurun Li; Qihong Feng; Sen Wang; Jiawei Ren
### Question and answer: Parallel sessions 1 (cont.)

**Q&A 25 16:00 – 16:55 - Chairs: Martin Blunt, James McClure**

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<th>Number</th>
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<tr>
<td>[1241]</td>
<td>Review and Comparison of Numerical Strategies to Estimate the Full</td>
<td>Hermes Scandelli; Jean Lachaud; Azita Ahmadi</td>
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<tr>
<td></td>
<td>Permeability Tensor of Anisotropic Materials From Micro-Tomography Images.</td>
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<tr>
<td>[1027]</td>
<td>Transfer of mass and momentum at interface between porous media and free flows.</td>
<td>Shervin Bagheri; Ugis Lacis; Simon Pasche; Yogaraj Sudhakar</td>
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### Question and answer: Parallel sessions 2

**Q&A 20 09:00 – 09:55 - Chairs: Ke Xu, Holger Ott**

<table>
<thead>
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<th>Number</th>
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<tr>
<td>[856]</td>
<td>Effect of Salinity on Water-Alternating-Gas (WAG) Injection in Microporous Media.</td>
<td>Vishnu Bhadran; Yit-Fatt Yap; Afshin Goharzadeh</td>
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<td>[31]</td>
<td>Critical Gas Saturation and Relative Permeability for Pressure Depletion and Gas Injection Processes.</td>
<td>Steffen Berg; Ying Gao; Apostolos Georgiadis; Niels Brussee; Ab Coorn; Hilbert van der Linde; Jesse Dietderich; Faruk Omer Alpak; Daniel Eriksen; Miranda Mooijer-van den Heuvel; Jeff Southwick; Matthias Appel; Ove Bjorn Wilson</td>
</tr>
<tr>
<td>[539]</td>
<td>Study on Film effects during isothermal diffusion dominated evaporative drying of square capillary tube using Lattice Boltzmann model.</td>
<td>Supriya B; Debashis Panda; Nicole Vorhauer; Vikrant Kumar Surasani</td>
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<tr>
<td>[1220]</td>
<td>Mechanism Study on the Influence of Low Salinity Water on Interface Characteristics of the Fluid and Rock.</td>
<td>Di Zhu; Binfei Li; Zhaomin Li; Haifeng Li</td>
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<td>[337]</td>
<td>Microscopic flow mechanism of shale oil based on digital cores with multi-mineral phases.</td>
<td>Lian Duan; Hai Sun; Jun Yao; Lei Zhang; Yongfei Yang</td>
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<tr>
<td>[643]</td>
<td>Direct imaging of bubble ripening in two-dimensional porous media micromodels.</td>
<td>Nerine Joewondo; Valeria Garbin; Ronny Pini</td>
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<td>[101]</td>
<td>Influence Mechanism of Potential Determining Ions on Oil-in-water Emulsion Stability in Smart Water-flooding.</td>
<td>Rukuan Chai; Yuetian Liu; Liang Xue</td>
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<tr>
<td>[1261]</td>
<td>Inverse Gas Chromatography– a way to determine structural and surface chemical properties of the internal rock surfaces for core-scale wettability characterization.</td>
<td>Maja Ruecker; Majid Naderi; Daryl Williams; Apostolos Georgiadis; Paul F Luckham</td>
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**THURSDAY, 3 SEPTEMBER 2020**

**Question and answer: Parallel sessions 2 (cont.)**

**(MS 20) Biophysics of living porous media: theory, experiment, modeling and characterization**

**Q&A 21 10:00 – 10:55 - Chairs: Dominik Obrist, Fred Vermolen**

Erlend Hodneland; Jan Martin Nordbotten

Zubin Trivedi; Christian Bleiler; Arndt Wagner; Oliver Röhrle

Vegard Vinje; Miroslav Kuchta; Marie E. Rognes; Timo Koch; Kent-Andre Mardal

Kun Xie; Kaoping Song; Xiangguo Lu; Bao Cao; Jian Hou; Wei Lin; Jinxiang Liu; Weijia Cao; Cheng Su

Qiyao Peng; Fred Vermolen

[1047] Modeling perfusion in cardiac tissue. 
Rodrigo Weber dos Santos; João R. Alves; Evandro D. Gaio; Rafael AB de Queiroz

Bin Guo; Huijin Xu; Changying Zhao

[38] Modeling fluid flow/heat/mass transport in an idealized fractal porous structure. 
Chenqian Wu; Huijin Xu; Changying Zhao

**(MS 21) Effective elastic, thermal, electrical and optical properties of porous materials, cellular materials, foams and metamaterials**

**Q&A 23 14:00 – 14:55 - Chairs: Yongfei Yang, Hamed Aslannejad**

[251] How to take into account of clay content in computing elastic moduli of arenites from micro-tomographic images. 
Jiabin Liang; Stanislav Glubokovskikh; Boris Gurevich; Maxim Lebedev; Stephanie Vialle; Alexey Yurikov

[536] Elastic equivalent numerical modeling of porous media digital core. 
Shi-kai Jian; Liyun Fu; Qiang Liu; Lijie Cui

Weichao Yan; Jianmeng Sun; Likai Cui
THURSDAY, 3 SEPTEMBER 2020

Question and answer: Parallel sessions 2 (cont.)

(110x672) Fluid Interactions with Thin Porous Media

**Q&A 23 14:00 – 14:55 - Chairs: Yongfei Yang, Hamed Aslannejad**

Dieter Froning; Uwe Reimer; Werner Lehnert

[349] Dynamics of capillary rise and finger formation in angular pores.  
*Thijs de Goede*; Rozeline Wijnhorst; Daniel Bonn; Noushine Shahidzadeh

*Ye Wang*; *Yilin Lin*; *Guang Yang*; *Jingyi Wu*

[23] Occurrence of temperature spikes at a wetting front during spontaneous imbibition.  
*Hamed Aslannejad*; S. S. Majid Hassanizadeh; Alex Terzis; Bernhard Weigand

*Vítor Sermoud*; Gabriel Barbosa; Amaro Barreto Jr.; Frederico Tavares; Iuri Segtovich; Jessica Maciel

(110x56) Interfacial phenomena in multiphase systems – Part 3

**Q&A 24 15:00 – 15:55 - Chairs: Grigori Chapiro, Hai Sun**

[367] Experimental investigation of contact angle change and oil globule movement in a capillary.  
*Lifei Yan*; *Hamed Aslannejad*; S. Majid Hassanizadeh; Amir Raoof

[571] Interfacial Viscoelasticity in Crude Oil-water Systems.  
*Ahmed M. Saad*; Stefano Aime; Sharath Mahavadi; Y-Qiao Song; Maxim Yutkin; Tadeusz Patzek; David A. Weitz

*Fansheng Huang*; Changyin Dong; Xiaosen Shang

*Kai Li*; William Rossen; Karl-Heinz Wolf

*Dawang Zhang*; Bjornar Sandnes

*Menggang Wen*; Yun Li

*Mohsen Mirzaie Yegane*; *Julia Schmidt*; Fatima Dugonjic-Bilic; Benjamin Gerlach; Pacelli Zitha

*Rodrigo Orlando Salazar Castillo*; Lily Qian; William R. Rossen
Question and answer: Parallel sessions 3

(MS 10) Advances in imaging porous media: techniques, software and case studies – Part 3

**Q&A 20 09:00 – 09:55 - Chairs: Adrian Sheppard, Nima Shokri**

[1020] X-ray CT core flooding study to understand the impact of clay interlayers on supercritical CO2 migration in sandstones.

Liang Xu; Matthew Myers; Cameron White; Qi Li

[553] Microstructure characterization and permeability modeling of creeping porous media under various pressures.

Yuxuan Xia; Jianchao Cai; Sai Xu; Haitao Tian; Yang Liu


Agnese Piovesan; Tim Van De Looverbosch; Pieter Verboven; Clement Achille; Cesar Parra Cabrera; Elodie Boller; Yin Cheng; Rob Ameloot; Bart Nicolai


Changzhong Zhao; Yi Zhang; Baokun Zhao; Yongchen Song

[45] Enhanced Gas Recovery evaluated with 1D NMR imaging and relaxometry measurements.

Ming Li; Sarah J. Vogt; Xiaoxian Yang; Paul Connolly; Eric F. May; Michael L. Johns

[725] Study on Formation Damage Mechanism of a Sandstone Reservoir based on Micro-Computed Tomography.

Zhiyu Wang; Yongfei Yang; Jun Yao; Xinze Li; Yingwen Li; Changfu Liu

[262] Level set based automatic in-situ contact angle measurement.

Yingfang Zhou


Michał Dzikowski; Marcin Dabrowski

(MS 19) Electrochemical processes in porous media – Part 1

**Q&A 22 11:00 – 11:55- Chairs: Pablo García-Salaberri, Ezequiel Medici**

[389] Pore-network modeling of gas diffusion layers in polymer electrolyte fuel cells using a continuum-based formulation

Pablo Ángel García-Salaberri; Iryna Zenyuk; Jeff Gostick; Adam Z. Weber

[1219] Modelling non-isothermal effects in a proton exchange membrane fuel cell (PEMFC)

Sagrario Muñoz; V. María Barragán

[1247] Reactive transport in porous media: Modeling electro-diffusion process using Nernst-Planck-Poisson Equation

Sara Tabrizinejadas; Jerome Carrayrou; maarten saaltink; Marwan Fahs
Question and answer: Parallel sessions 3 (cont.)

**Q&A 22 11:00 – 11:55 - Chairs: Pablo García-Salaberri, Ezequiel Medici**

[144] On volume averaging modelling of porous electrodes – intrinsic phase average and macroscopic flux definition at solid/electrolyte interface
Xiaoguang Yin; Zeyong Wang; Thomas Sweijen; S. S. Majid Hassanizadeh; Baohua Li

[924] Non-isothermal Battery Modelling
Astrid F. Gunnarshaug; Lena Spitthoff

Vanesa Muñoz Perales; Santiago Enrique Ibañez-León; Sabrina Berling; Enrique García-Quismondo; Jesús Palma; Pablo Ángel García-Salaberri; Marcos Vera

[381] “Hot Spots” observed in pore scale simulation of flow in carbon fibre felt electrodes may limit the efficiency of Redox Flow Battery operation.
Farrel Gray; Ioannis Zacharoudiou; Rhodri Jervis; Edo Boek

[634] Research on Different Storage Space Types of Marine Carbonate Buried Hills and Their Impact on Liquid Production Capacity------A case from the X structure of Shijiu tuo uplift in Bohai Bay Basin.
Peng Shi; Yong Hu; Caiqi Zhang; Zhou Fang; Guangming Pan

**Q&A 23 14:00 – 14:55 - Chairs: Jeff Gostick, Iryna Zenyuk**

[1277] Towards scalable multi-scale open-source solvers for ionic transport and electrochemistry
Matteo Icardi; Federico Municchi; Robert Barnett

[1204] Comparing chronopotentiometric behavior in homogeneous cation- and anion- exchange membranes
Chunyu Tian; Kim Roger Kristiansen; Signe Kjelstrup; V. María Barragán García

[772] Study on electrokinetic reactive fluid in dielectric porous media with Lattice Boltzmann Method
Haijing Li; Herman Clercx; Federico Toschi

[249] PEM fuel cell performance studies of a tree-like pattern milled on graphite flow field plates
Marco Sauermoser; Signe Kjelstrup; Natalya Kizilova; Bruno G. Pollet

[150] Visualizing 3D distribution of wet domain in microporous layer in polymer electrolyte fuel cell by X-ray computed tomography under water vapor supply
Satoru Kato; Satoshi Yamaguchi; Wataru Yoshimune; Yoriko Matsuoka; Akihiko Kato; Yasutaka Nagai; Takahisa Suzuki

[442] Pore-scale study of reactive transport processes in porous electrodes of pemfc
Ting Min; Li Chen; Kang Qinjun; WenQuan Tao

Emna Mejri; Rainer Helmig; Rachida Bouhlila
### THURSDAY, 3 SEPTEMBER 2020

**Question and answer: Parallel sessions 3 (cont.)**

**Q&A 23 14:00 – 14:55 - Chairs: Jeff Gostick, Iryna Zenyuk**

- **[1162] 4-D Imaging of Desaturation of the Frozen Gas Diffusion Layers by Synchrotron X-ray Radiography.**
  - **Zhang Yuzhou**

**Q&A 24 15:00 – 15:55 - Chairs: Huijin Xu, Satoru Kato**

- **[884] Thermal stimulation to activate the desorption of shale gas over organic-rich shales.**
  - **Xinlei Li; Lijun You; Yili Kang; Jiang Liu; Mingjun Chen**
- **[158] Experimental study on evolution law of key parameters and characterization of initial gas desorption of coal particles.**
  - **Chaojie Wang; Xiaowei Li; Changhang Xu; Yue Niu**
- **[512] Sorption characteristics of biomass-based carbonaceous materials for containment of volatile organic compounds (VOC).**
  - **Hamid Rajabi; Mojgan Hadi Mosleh; Amanda Lea-Langton; Parthasarathi Mandal**
- **[1016] Measuring and Modelling Supercritical Adsorption in Shales.**
  - **Humera Ansari; Martin Trusler; Geoffrey Maitland; Claudio Delle Piane; Ronny Pini**
  - **Jocenrique Carlo de Oliveira Rios; Adriano dos Santos; Sidarta Araújo de Lima**
- **[961] 3D pore scale simulation of reactive flow in catalytic filter on CT image.**
  - **Oleg Iliev; Torben Prill; Pavel Toktaliev; Robert Greiner; Martin Votsmeier**
- **[289] Pore Structure Analysis for Exhaust Particle Filter Development.**
  - **Atsushi Tanaka; Naoto Miyoshi; Akemi Sato**
  - **Jacquelin Cobos Mora; Erik Gydesen Søgaard**
- **[1140] Investigation of adsorption and diffusion behaviors of multi-component gases in kerogen.**
  - **Yu Shi; Xiaona Yang**
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Interactive card magic show
17:30 - 17:55 CET

What you did not know about the porosity of cards

Jaime Gómez-Hernández, the president of the local organizing committee of InterPore2019, also known as the magician Placebus, will perform a live interactive card magic show. You can simply enjoy the show by connecting to the live event at the specified time and watching it, or you can participate and play along so that the magic will take place at your fingertips; the only thing you need is a regular deck of poker cards and a desk space in front of you onto which to deal the cards. You will see the magic happening in front of you and will understand a little bit about the abnormal porosity of poker cards.

Those of you who were lucky enough to catch Jaime’s live act last year in Valencia know - you do not want to miss this!
THURSDAY, 3 SEPTEMBER 2020
Time Block C

Award Ceremony
18:00 - 18:10 CET

InterPore - PoreLab Award for Young Researchers
Hamad Aslannejad
Utrecht University, The Netherlands

A word of gratitude:
This award has been made possible by a generous grant from PoreLab (a research center of excellence jointly formed by Norwegian University of Science and Technology (NTNU)) in Trondheim and the University of Oslo (UiO). PoreLab focuses on the physics of porous media using experimental, theoretical and computational methods.

Rien van Genuchten Early-Career Award of Porous Media for a Green World
Basant Yadav
Cranfield University, England

A word of gratitude:
This award has been made possible by a generous donation from Dr. Betty-May Pontedeiro to the InterPore Foundation and is created in honor of the eminent soil and groundwater scientist Marthinus (Rien) Th. van Genuchten. Rien van Genuchten is world renown for his enormous achievements in the area of fluids flow and solutes transport in partially-saturated porous media. He has made highly impactful contributions to the understanding and modeling of subsurface processes in widely varying fields.
Keynote Lecture
18:10 - 18:55 CET

Dominik Obrist
University of Bern

Microscopical lesions of the transport system of organs and their relation to clinically observable large-scale phenomena

Many diseases are directly related to microscopical lesions of the transport system of organs: Cystic fibrosis, for example, leads to obstructions of the smallest airways; Multiple sclerosis can be connected to leaking capillaries in the brain; and recovery after a heart attack can be limited by microvascular obstruction of the heart muscle. Reliable and accurate diagnosis of such lesions is important for the early detection and targeted treatment of the diseases. Unfortunately, their clinical diagnosis is very difficult, because the small structures are inaccessible to interventional instruments and the resolution of imaging modalities is too coarse. Therefore, diagnosis is typically based on limited information obtained from large-scale phenomena which can be observed clinically.

We developed multi-scale models which allow us to infer the state of microscopical lesions from observable large-scale phenomena. To this end, it is helpful to model the smallest structures of an organ as porous medium which is coupled with a large-scale advective transport model. We will present several computational and experimental multi-scale models of organs and demonstrate how they can be used to support the diagnosis of diseases of the brain, heart and lung.

Diagnosis of lesions of microvascular structures in the human body is difficult, because these structures are inaccessible to classical interventional instruments and the resolution of clinical imaging modalities is too coarse.

Many organs of the human body can be split into large scale systems and small scale systems. Whereas the large scales are typically connected to transport processes (e.g. arteries transporting blood from the heart to the tissue), the small-
scale systems are seen as the place for substance exchange (e.g. capillary blood vessels where O2 and CO2 are exchanged between blood and tissue).

Pathologies of the small scale structures are difficult to diagnose and treat because of a lack of accessibility of these structures with clinical instruments and a lack of observability with the available imaging modalities. Therefore, there is a need for developing diagnostic methods which allow us to infer pathological conditions at small scale from observations at large scale.

I will present methods on the example of three different organs: diagnosis of microvascular lesions in the myocardium after heart attack, in the brain of MS patients and in the lung for Cystic fibrosis and congenital microvascular malformations in the extremities.

Closing Ceremony
18:55 - 19:10 CET
13th International Conference on Porous Media & Annual Meeting
May 31 - June 3, 2021 - Edinburgh, Scotland
Short Courses on May 30 & June 4

The scientific program will include subjects related to porous media and range from pore-scale modeling, pore-scale imaging, to experimental and numerical methods on larger scales, to sensitivity and uncertainty analysis.

Topics and Applications
- Mass and heat transport
- Multiphysics-multiphase flow
- Reservoir engineering, CO2 sequestration, geothermal energy and energy storage
- Colloids and nanoparticle transport
- Soil mechanics and engineering
- Swelling porous media
- Wave propagation
- Biotechnology and biofilms
- Thin and nanoscale poromechanics
- Fuel cells and batteries
- Food, wood, composites
- Fibers and textiles
- Filters, foams, membranes, papers
- Ceramics and construction materials

Venue and city
The 13th Annual InterPore Meeting will be held at the Edinburgh International Conference Centre (EICC) in the heart of Edinburgh, Scotland. Home to three UNESCO Heritage Sites, four Universities and named the UK’s "Greenest City", Edinburgh is full of history, culture and places waiting to be explored.

EICC’s state-of-the-art facilities include adaptable auditoria, break-out suites and spacious exhibition and reception areas all complemented by the latest technologies. The EICC is easily accessible by public transportation and is only 10km away from Edinburgh International Airport, which offers over 300 flights a day to more than 130 UK and worldwide destinations.

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School of Energy, Geoscience, Infrastructure and Society
Heriot Watt University

Co-Chairs: Andreas Busch, Florian Doster, Sebastian Geiger
InterPore2020

12th ANNUAL MEETING

Detailed Program, Addendum

30 August 2020
### Timing of Q&A sessions on Tuesday

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<td>MS13, part1</td>
<td>MS17, part1</td>
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<td>A (11:05 – 12:00)</td>
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<td>MS13, part2</td>
<td>MS6-A, part2</td>
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<td>B (14:35 – 15:30)</td>
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<td>MS1, part3</td>
<td>MS13, part3</td>
<td>MS14, part1</td>
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<td>B (15:35 – 16:30)</td>
<td>Q&amp;A 10</td>
<td>MS1, part4</td>
<td>MS13, part4</td>
<td>MS18, part1</td>
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<td>C (18:00 – 18:55)</td>
<td>Q&amp;A 11</td>
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<td>MS13, part5</td>
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<td>MS4</td>
<td>MS17, part2</td>
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<td>C (20:00 – 20:55)</td>
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<td>MS6-A, part3</td>
<td>MS23, part1</td>
<td>MS14, part2</td>
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### Question and answer: Parallel sessions 3

(MS 18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers – Part 2

**Q&A 11 18:00 – 18:55 - Chairs: Marios Valavanides, Qi Li**

[1310] The first nanoremediation pilot-test in Brazil: site selection criteria and nZVI mobility studies  
*Daphne Silva Pino; Reginaldo Bertolo; Petr Kvapil; Carlo Bianco; John Etim; Tannaz Pak*

[1283] Method of Moments to Characterize a Reservoir Using a Single Non-Ideal Tracer Test  
*Deepshikha Singh; Jyoti Phirani*

[1282] Quantifying wetted area of sediments during multiphase flow in geological porous media  
*Deepshikha Singh; Jyoti Phirani*

[1170] EUTROFICATION CONTROL TREATMENTS AND CARBON GAS EMISSIONS  
*Danilo A. Sandoval; Anne M. Hansen; Armando González-Sánchez; Rodolfo Sosa-Echeverría*

[1271] Mathematical modeling of the fate and transport of per- and polyfluoroalkyl substances (PFAS) in the vadose zone  
*Bo Guo; Jicai Zeng; Mark Brusseau*

[113] Micro-Scale Mechanism Analysis of NAPL Contamination Remediation in Heterogeneous Porous Media  
*Xiaopu Wang; Xu Wang; Yan Li*

[181] Migration and Residual Trapping of Immiscible Fluids during Cyclic Injection  
*Sookyun Wang*
Timing of Q&A sessions on Wednesday

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<th>Parallel sessions 1</th>
<th>Parallel sessions 2</th>
<th>Parallel sessions 3</th>
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<td>Q&amp;A 14</td>
<td>MS6-A, part 4</td>
<td>MS2</td>
<td>MS12, part 1</td>
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<td>Q&amp;A 15</td>
<td>MS6-A, part 5</td>
<td>MS15, part 1</td>
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Question and answer: Parallel sessions 1

(STAT 6-A) Physics of multi-phase flow in diverse porous media– Part 4

**Q&A 14 09:35 – 10:30 - Chairs: Ryan Armstrong, Tannaz Pak**

[801] Gas Slippage in Partially Saturated Tight Rocks  
*Steffen Nolte; Mohammadebrahim Shabani; Reinhard Fink; Bernhard M. Krooss; Alexandra Amann-Hildenbrand*

*Dongxing Du; Yinjie Shen; Di Zhao; Weifeng Lv; Ninghong Jia; Tong Li; Yingge Li*

[1230] Study on multi-phase seepage of complex pore network in strongly heterogeneous carbonate reservoir based on various methods: A case study in Upper Cretaceous Khasib of the E Oilfield in the Middle East  
*Hao Lu; Hongming Tang; Yijun Wang*

[199] Study on micro seepage model of nanopore in shale gas reservoir considering diffusion and slippage effect.  
*Lijuan Jiang; Hongguang Sun*

[1214] Mechanism study on water plugging and EOR by nitrogen foam injection in bottom-water reservoirs  
*Danqi Chen; Binfei Li; Zhengxiao Xu; Kun Liu; Huiyu Yang; Zheyang Liao*

[700] Experimental study on enhanced oil recovery of offshore heavy oil reservoirs by activated water flooding  
*Xin Chen; Yiqiang Li; MingYue Sui; Jian Zhang; Han Zhang*

[589] Measurement and Research of Two-phase Micro-force of Foam Fluid and Heavy Oil  
*Zihan Gu; Zhaomin Li; Teng Lu; Zhengxiao Xu; Sheng Li; Xinru Zhao*

[288] A SEM Study on the “Smart Water” Assisted Polymer Flooding in Sandstone Reservoirs  
*Hongna Ding; Xinjian Tan*
Detailed Program, Addendum

31 August 2020
Question and answer: Parallel sessions 1

(MS1) Porous Media for a Green World: Energy & Climate – Part 4

**Q&A 10 15:35 – 16:30 - Chairs: Rainer Helmig, William Rossen, Julien Maes**

*Amir Jahanbakhsh; Jonaid Hasan Bajwa; Nazia Mubeen Farooqui; M. Mercedes Maroto-Valer; Mojgan Hadis Mosleh; Harshit Agrawal; Anna Korre; Sevket Durucan*

*Debanjan Chandra; Vikram Vishal*

[1227] Carbon Dioxide Plume in Bespoke 2D Porous Micromodels.  
*Niloy De; Patrice Meunier; Yves Méheust; François Nadal;*

[992] Experimental Investigation on the Effects of Ion Type/Valency and Ionic Strength of Formation Water on Rock-Fluid Interactions during CO2 Geological Storage.  
*Shima Ghanaatian; Omid Shahrkhi; Susana Garcia; M. Mercedes Maroto-Valer*

[1246] Numerical Simulation of CO2 enhanced gas recovery (CO2-EGR) for the optimal CO2 injection perforation position and injection rate.  
*Liu Shuyang; Sun Baojiang*

[315] Evaluation of CO2 enhanced recovery potential as pre-pad in tight reservoir compared with slickwater.  
*Liyao Fan; Yuliang Su; Lei Li; Mingyu Cai; Zheng Chen; Chengwei Wang; Xiaogang Gao*

*Rafael March; Florian Doster; Sebastian Geiger*

*Muhammad Yasir; Hui Sheng; Sami Ur Rehman; Atif Zafar; Muhammad Ilyas; Asif Mehmood*
### Q&A 11 18:00 – 18:55 - Chairs: Marios Valavanides, Qi Li

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<td>[1310]</td>
<td>The first nanoremediation pilot-test in Brazil: site selection criteria and nZVI mobility studies</td>
<td>Daphne Silva Pino; Reginaldo Bertolo; Petr Kvapil; Carlo Bianco; John Etim; Tannaz Pak</td>
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<tr>
<td>[1283]</td>
<td>Method of Moments to Characterize a Reservoir Using a Single Non-Ideal Tracer Test</td>
<td>Deepshikha Singh; Jyoti Phirani</td>
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<td>[1282]</td>
<td>Quantifying wetted area of sediments during multiphase flow in geological porous media</td>
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<td>[1170]</td>
<td>EUTROFICATION CONTROL TREATMENTS AND CARBON GAS EMISSIONS</td>
<td>D'Angelo A. Sandoval; Anne M. Hansen; Armando González-Sánchez; Rodolfo Sosa-Echeverría</td>
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<td>[1271]</td>
<td>Mathematical modeling of the fate and transport of per- and polyfluoroalkyl substances (PFAS) in the vadose zone</td>
<td>Bo Guo; Jicai Zeng; Mark Brusseau</td>
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<td>[113]</td>
<td>Micro-Scale Mechanism Analysis of NAPL Contamination Remediation in Heterogeneous Porous Media</td>
<td>Xiaopu Wang; Xu Wang; Yan Li</td>
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<td>[181]</td>
<td>Migration and Residual Trapping of Immiscible Fluids during Cyclic Injection</td>
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**Question and answer: Parallel sessions 3**

**(MS 18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers– Part 2**

**Q&A 11 18:00 – 18:55 - Chairs: Marios Valavanides, Qi Li**

[1310] The first nanoremediation pilot-test in Brazil: site selection criteria and nZVI mobility studies
*Daphne Silva Pino; Reginaldo Bertolo; Petr Kvapil; Carlo Bianco; John Etim; Tannaz Pak*

[1283] Method of Moments to Characterize a Reservoir Using a Single Non-Ideal Tracer Test
*Deepshikha Singh; Jyoti Phirani*

[1282] Quantifying wetted area of sediments during multiphase flow in geological porous media
*Deepshikha Singh; Jyoti Phirani*

[1170] EUTROFICATION CONTROL TREATMENTS AND CARBON GAS EMISSIONS
*DAngelo A. Sandoval; Anne M. Hansen; Armando González-Sánchez; Rodolfo Sosa-Echeverría*

[1271] Mathematical modeling of the fate and transport of per- and polyfluoroalkyl substances (PFAS) in the vadose zone
*Bo Guo; Jicai Zeng; Mark Brusseau*

[113] Micro-Scale Mechanism Analysis of NAPL Contamination Remediation in Heterogeneous Porous Media
*Xiaopu Wang; Xu Wang; Yan Li*

[181] Migration and Residual Trapping of Immiscible Fluids during Cyclic Injection
*Sookyun Wang*

[1142] An experimental study on the impacts of gas pressure on carbon isotope fractionation during methane desorption in shale rock
*Yongbo Wei*
### Timing of Q&A sessions on Wednesday

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#### Question and answer: Parallel sessions 3

(MS 10) Advances in imaging porous media: techniques, software and case studies – Part 1

**Q&A 15 10:35 – 11:30 - Chairs: Liwei Zhang, Matthijs de Winter**

- [1292] Measuring contact angles in a two-phase flow experiment using home-laboratory micro-computed tomography. *Kim Robert Tekseth; Dag Werner Breiby*

- [796] Facilitating visualization and analysis of time-resolved X-ray micro-CT data using sliding widow reconstruction and flip point detection. *Marijn Boone; Jan Dewancke; Arno Merkle; Tom Bultreys; Tom De Kock*

- [555] SEM, Raman and Micro-CT characterization of CO2–Induced Wellbore Cement degradation. *Yan Wang; Liwei Zhang; Xiuxiu Miao; Manguang Gan*

- [391] The influence of confining pressure and flow process on the corrosion of wellbore cement under geological storage environment. *Manguang Gan; Liwei Zhang; Xiuxiu Miao; Yan Wang; Xiaochun Li*


- [551] Distribution and Quantitively Evaluation of Micro Residual Oil after Polymer Flooding based on CT Scanning. *Liu Tao; Yongfei Yang; Jun Yao; Lei Zhang; Hai Sun*

- [875] Experimental Study on Phase Transition Characteristics of CO2 in Porous Media of Low Permeability Reservoirs. *Huo hongbo; Li jinman; Ma kuiqian; Hu yang; Li Hongyuan*

- [405] A fractal analysis of stress sensitivity of a porous medium based on the thick-walled Cylinder Model. *Xin Su; Zhaoqin Huang; Jun Yao*
Question and answer: Parallel sessions 3

(MS 10) Advances in imaging porous media: techniques, software and case studies – Part 3

**Q&A 20 09:00 – 09:55 - Chairs: Adrian Sheppard, Matthijs de Winter**

- [1020] X-ray CT core flooding study to understand the impact of clay interlayers on supercritical CO₂ migration in sandstones.
  
  Liang Xu; Matthew Myers; Cameron White; Qi Li

- [553] Microstructure characterization and permeability modeling of creeping porous media under various pressures.
  
  Yuxuan Xia; Jianchao Cai; Sai Xu; Haitao Tian; Yang Liu

  
  Agnese Piovesan; Tim Van De Looverbosch; Pieter Verboven; Clement Achille; Cesar Parra Cabrera; Elodie Boller; Yin Cheng; Rob Ameloot; Bart Nicolai

  
  Changzhong Zhao; Yi Zhang; Baokun Zhao; Yongchen Song

- [45] Enhanced Gas Recovery evaluated with 1D NMR imaging and relaxometry measurements.
  
  Ming Li; Sarah J. Vogt; Xiaoxian Yang; Paul Connolly; Eric F. May; Michael L. Johns

- [725] Study on Formation Damage Mechanism of a Sandstone Reservoir based on Micro-Computed Tomography.
  
  Zhiyu Wang; Yongfei Yang; Jun Yao; Xinze Li; Yingwen Li; Changfu Liu

- [262] Level set based automatic in-situ contact angle measurement.
  
  Yingfang Zhou

  
  Michał Dzikowski; Marcin Dabrowski