



Contribution ID: 232

Type: **Oral Presentation**

Numerical Analysis of a Mixed Finite Element Approximation a Model of Biofilm Growth in Porous Media

Thursday, 2 June 2022 11:20 (15 minutes)

We consider a coupled system of advection-diffusion-reaction PDEs modeling biofilm growth and nutrient consumption in porous media. One of the PDEs is subject to a constraint on the biomass density, so it can be formulated as a parabolic variational inequality (PVI). Moreover, the model is coupled to a heterogeneous Brinkman model of flow of an ambient fluid flowing within and outside the biofilm. We approximate the model using a mixed finite element method. We conduct realistic simulations in complex pore-scale geometries. We study the solvability of the associated PVI and derive a rigorous error estimate of the fully implicit approximation of the biofilm-nutrient model. We compare the results with our previous work where the Galerkin finite element method is used.

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Country

Saudi Arabia

References

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

In person

Primary authors: Dr ALHAMMALI, Azhar (Imam Abdulrahman Bin Faisal University); Prof. PESZYNSKA, Malgorzata (Oregon State University); Dr SHIN, Choah (Ab Initio Software)

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Session Classification: MS07

Track Classification: (MS07) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes