Contribution ID: **234** Type: **Oral Presentation**

Experimental Study of Liquid Cohesion Impact on Particle Clogging in Rock Fractures

Thursday, 16 May 2024 09:05 (15 minutes)

Suspended particle migration and clogging processes in rock fractures are ubiquitous in nature and industrial activities like hydraulic fracturing and hole-drilling fluid leakage resistance. As a common type of particle cohesion, the impact of liquid cohesion on clogging in rock fractures and its mechanism remain unclear. We conduct visualized experiments and discover that even if a small amount of immiscible liquid phase is added into the particle suspension, the clogging in fractures is significantly enhanced. By varying the flowrate and secondary liquid content, four patterns of particle clogging behaviors are found. The reason for clogging enhancement is further explained by the particle agglomeration induced by capillary cohesion. To quantify the effect of capillary cohesion, we propose a theoretical model of agglomerate size distribution as a function of various secondary liquid content and a criterion for particle agglomerate clogging in rock fracture. These findings have potential applications in numerous field applications involving particle migration and clogging, including oil/gas exploitation, drilling fluid leakage resistance, and drilling cuttings underground disposal, etc.

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

I would like to submit this presentation into both awards

Country

China

Porous Media & Biology Focused Abstracts

References

Zhang, R., Yang, Z., Detwiler, R., Li, D., Ma, G., Hu, R., & Chen, Y. F. (2023). Liquid cohesion induced particle agglomeration enhances clogging in rock fractures. Geophysical Research Letters, 50(5), e2022GL102097.

Conference Proceedings

I am interested in having my paper published in the proceedings.

Primary author: Mr ZHANG, Renjun (Wuhan University)

Co-authors: YANG, Zhibing (Wuhan University); DETWILER, Russ; LI, Dongqi (North China University of Water Resources and Electric Power); Prof. MA, Gang; HU, Ran (Wuhan University); CHEN, Yi-Feng (Wuhan University)

Presenter: Mr ZHANG, Renjun (Wuhan University)

Session Classification: MS03

Track Classification: (MS03) Flow, transport and mechanics in fractured porous media