Contribution ID: **531** Type: **Poster (+) Presentation**

Multiscale modeling and simulation of microbially-induced calcite precipitation in porous media

Friday, 4 June 2021 09:40 (1 hour)

Microbially induced calcite precipitation (MICP) in soils can be fundamentally explained by combined theories of reactive transport and metabolic-related biological activities in porous media. Still, it is challenging to describe both the biofilm growth and mineral precipitation at smaller scales, yet their competition and effects on larger-scale transport behaviors remain unclear. To advance the understanding of the MICP process, especially the mechanisms at the pore scale and its effect at larger scales, we hereby present a multiscale porous media model that couples fluid flow, reactive transport and biofilm growth. The coupled model is developed under the Darcy - Brinkman - Stokes equation (DBS) framework, embedded in OpenFOAM then applied to simulate the MICP in synthetic porous media. Results show that he proposed model can capture the evolving transport processes including urea hydrolysis promoted by microorganisms, the co-play of the biofilm growth and CaCO3 precipitation, and the fluid flow under the influence of the dynamic change of the pore morphology. A series of impact factors on the MICP process, such as the initial biomass, rates of fluid flow, chemical reaction and biofilm growth, as well as the interplay between biofilm and CaCO3 precipitation, are also analyzed.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

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Soulaine, C., Roman, S., Kovscek, A. (2018) Pore-scale modelling of multiphase reactive flow: application to mineral dissolution with production of[J]. Journal of Fluid Mechanics, 855: 616-645.
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Session Classification: Poster +

Track Classification: (MS5) Biochemical processes and biofilms in porous media