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Flow and transport of particle-laden liquids over permeable surfaces; Theory and experiment

Thursday, 17 May 2018 13:45 (25 minutes)

The particle-laden liquids and their interaction with a permeable medium are important in various industries. However, research into their interaction has been bifurcated into two independent directions: suspension flows in geometries with smooth surfaces and flows of pure Newtonian fluids over porous media. Derivation of experimentally validated models and theory, which predict their coupling behavior and allow exploration of the impact of parameters from both suspension and porous medium are important.
In this seminar, I will present the steps made to comprehensively address the motion of suspension flows over permeable surfaces inspired by the almost frictionless movement of red blood cells through microvessles/capillaries. I will highlight two aspects of my group's recent work that aim to understand the interrelation of flow and transport over porous surfaces in a Poiseuille flow system by: 1) analyzing the drag reduction of a suspension flows over porous media and 2) understanding their related instability. I will introduce the very first continuum scale framework that accounts for the interplay of key parameters including the characteristics of the flow, the porous media and the geometry of a channel on the drag reduction. In the second part, I will characterize the flow-state boundary structure. The experimental analysis to understand the detailed analysis of the flow over and at the interface of various specific porous media using the pressure drop measurements and PIV (particle image velocimetry) technique will be also reviewed.

References

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Session Classification: Invited 4 (Room B) - Parisa Mirbod

Track Classification: GS 4: Porous media applications (renamed)