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Modeling Dense Liquid-Solid Flows[1] DONALD BERGSTROM, TYLER SHENDRUK, University of Saskatchewan — The transport of solid particles in a turbulent flow has many industrial applications, including the liquid-slurry flows encountered in the mining industry. For numerical simulation of particle-laden flows, the two-fluid model utilises an Eulerian formulation of the mean fields, which treats the liquid and solid phases as interpenetrating continua. For both gas and liquid flows, at high particle concentrations, the flow characteristics are strongly influenced by the particle-particle and particle-wall interactions. The present study looks at the extension of two-fluid models originally developed for dilute gas-particle flows (e.g. Bolio et al, 1995) to liquid-solid flows, with the prediction of dense slurry flows as the long-term objective. In the case of a liquid, the interstitial fluid layer can modify the particle-particle and particle-wall collisions. For high solids concentrations, the turbulence can be significantly suppressed by the presence of particles. Both the solid and liquid phases are also affected by surface roughness at the wall. The present numerical study investigates the implementation of two-fluid models for fully-developed liquid-solid flows in the context of the modeling issues identified above.

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