Modeling Particle Concentration In Slurry Flows Using Shear-Induced Migration: Theory vs. Experiments KANHUI LIN, Hong Kong University, PAUL LATTERMAN, University of California, Los Angeles, TRYSTAN KOCH, Harvey Mudd College, VINCENT HU, JOYCE HO, MATTHEW MATA, NEBOJSA MURISIC, ANDREA BERTOZZI, University of California, Los Angeles — Different flow regimes observed in our experimental study of particle-laden thin film flows are characterized by differing particle concentration profiles. We develop a theoretical model for particle concentration in order to capture our experimental observations. Our model is based on equilibrium assumption and it incorporates all relevant physical mechanisms, including shear-induced particle migration and settling due to gravity. It leads to a coupled system of ordinary differential equations for particle volume fraction and shear, which are solved numerically for various parameter sets. We find excellent agreement between our numerical results and experimental data. Our model is not only successful in reproducing the experimentally observed regimes, but also in capturing the connection between these regimes and the experimental parameters.

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