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Sedimentation and Pressure Driven Flow in Fractures[1] TAK SHING LO, JOEL KOPLIK, The Levich Institute and Department of Physics, City College of City University of New York — Suspended particles are commonly found in reservoir fluids, which alter the rheology of the flowing liquids and may obstruct transport by narrowing flow channels due to gravitational sedimentation. An understanding of the transport and deposition dynamics of particulate suspensions is, therefore, important to many chemical, petroleum, environmental and geological processes. Realistic geological fractures usually have irregular rough surfaces with self-affine structures. We study the combined effects of sedimentation and transport of particles suspended in a Newtonian fluid in a pressure-driven flow in self-affine channels by using the lattice Boltzmann method, which is especially relevant to clogging phenomena where sediments may block continuous fluid flows in channels. The lattice Boltzmann method is flexible and particularly suitable for handling irregular geometry. We perform a systematic study covering a broad range in Reynolds and buoyancy numbers, and in particle concentrations. In particular, the transitions between the "jammed" and the "flow" states in fracture channels are investigated.

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