144p Concentrated Suspension Flow through an Abrupt Expansion Measured by Nmri

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Our research focuses on the flow of a concentrated suspension into an abrupt expansion, which can be encountered in such applications as materials processing or flow in the circulatory system. Fundamental understanding of such a system is limited, mainly due to the small amount of available experimental data and modeling calculations concerning suspensions in complex flow geometries. In this study, suspensions of neutrally buoyant, noncolloidal spheres in Newtonian liquids undergo steady, pressure-driven flow in an abrupt, axisymmetric 1:4 expansion. Nuclear magnetic resonance imaging (NMRI) is used to obtain particle concentration and velocity profiles. The effects of particle volume fraction, particle and flow Reynolds number, particle size, and inlet conditions are investigated with specific emphasis on interactions between particles and recirculating flow regions such as the corner vortices. For example, in the case of a long narrow tube inlet, observed vortex lengths for suspensions are greater than for Newtonian fluids at comparable Reynolds numbers. Results from expansion flow experiments at various inlet conditions will be presented.