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Rheological measurements of liquid-solid flows with inertia ESPERANZA LINARES, MELANY HUNT, California Institute of Technology, ROBERTO ZENIT, Universidad Nacional Autonoma de Mexico — This talk presents experimental measurements of effective viscosity for neutrally-buoyant suspensions in which the Reynolds numbers based on particle diameter varies from 1 to 1000 and for solid fractions from 10% to 50%. The measurements are conducted in a rough-walled, coaxial-cylinder rheometer. For Reynolds numbers from 1 to 100 and solid fractions less than 30%, the effective viscosities increase with Reynolds number and are comparable with recent numerical simulations found in the literature. For higher solid fractions, the effective viscosity shows shear thinning at the lowest shear rates, followed by thickening at higher shear rates. Over this range of Reynolds numbers for a pure fluid, the flow is laminar. At higher Reynolds numbers for a pure fluid, the flow transitions to turbulence. When particles are added under these flow conditions (particle Reynolds number greater than 100), the effective viscosity continues to increase with Reynolds number but with a greater magnitude. At the highest solid fractions, the effective viscosity is independent of shear rate.

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