

Abstract Submitted  
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**Friction factors of colloidal suspension containing silicon dioxide nanoparticles in water**<sup>1</sup> CLEMENT TANG, SARBOTTAM PANT, MD. TANVEER SHARIF, Univ of North Dakota — The purpose of this study is to experimentally characterize the friction factor of a colloidal suspension flow in circular and square tubes. The suspension contained silicon dioxide nanoparticles dispersed in distilled water at 9.58% volume concentration. Rheological measurements indicated that the suspension exhibits non-Newtonian behavior, and could be modelled as a power-law generalized Newtonian fluid. The experimental study showed that, with proper characterization of the consistency and flow behavior indices, the suspension flow friction factors in circular and square tubes exhibit similarities with those of Newtonian fluid flow. In the laminar fully-developed flow region, the Poiseuille numbers are similar to those established for Newtonian fluid flow. In the turbulent region, the Dodge and Metzner relation between the friction factor and a generalized Reynolds number can adequately describe the flow. The onsets of transition to turbulent flow for the suspension vary with the shape of the tube and differ from those of Newtonian fluid flow. The deviations suggest that the flow passage shape and the presence of nanoparticles affect the onset of transition to turbulent flow.

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