Abstract Submitted for the MAR15 Meeting of The American Physical Society

Inertial flow regimes of the suspension of finite size particles¹ IMAN LASHGARI, Linne FLOW Centre, KTH Mechanics, Stockholm, Sweden, FRANCESCO PICANO, Department of Industrial Engineering, University of Padova, Padova, Italy, LUCA BRANDT, Linne FLOW Centre, KTH Mechanics, Stockholm, Sweden — We study inertial flow regimes of the suspensions of finite size neutrally buoyant particles. These suspensions experience three different regimes by varying the Reynolds number, Re, and particle volume fraction, Φ^2 . At low values of Re and Φ , flow is laminar-like where viscous stress is the dominating term in the stress budget. At high Re and relatively small Φ , the flow is turbulent-like where Reynolds stress has the largest contribution to the total stress. At high Φ , the flow regime is as a form of inertial shear-thickening characterized by a significant enhancement in the wall shear stress not due to the increment of Reynolds stress but to the particle stress. We further analyze the local behavior of the suspension in the three different regimes by studying the particle dispersion and collisions. Turbulent cases shows higher level of particle dispersion and higher values of the collision kernel (the radial distribution function times the particle relative velocity as a function of the distance between the particles) than those of the inertial shear-thickening regimes providing additional evidence of two different transport mechanisms in the Bagnoldian regime.

¹Support from the European Research Council (ERC) is acknowledged. ²I. Lashgari, F. Picano, W-P. Breugen and L. Brandt, *Arxiv*:1402.3088

> Iman Lashgari Linne FLOW Centre, KTH Mechanics, Stockholm, Sweden

Date submitted: 10 Nov 2014

Electronic form version 1.4