Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Viscosity of confined suspensions. PHILIPPE PEYLA, YOHANN DAVIT, CLAUDE VERDIER, Universite Joseph Fourier - Grenoble, LSP - CNRS - DYFCOM TEAM — In this work, we study experimentally and numerically the viscosity of non-brownian confined suspensions of hard spherical particles confined between two walls in a shear flow. By varying the wall-to-wall distance (gap), we show that the viscosity presents a remarkable behavior as a function of the confinement. A transition occurs from a 3D configuration (no confinement) to a quasi2D (Q2D) one when the wall-to-wall distance becomes smaller than twice the spheres diameter. We find, as expected, that the effective viscosity increases when the gap decreases. This is due to dissipation which is enhanced for smaller gaps. But, more precisely, when the wall-to-wall distance decreases, the linear term in volumic fraction (diluted case) increases while the quadratic term decreases to zero when the suspension reaches a Q2D regime and becomes negative for smaller gaps. In a Q2D suspension, it is proven that an anti-drag effect holds between two particles which move perpendicularly to their connecting line. Experimental measurements on diffusion coefficients have been achieved for colloidal Q2D suspensions by Cui et al [1] which shows this behavior without any ambiguity. We suspect that such anti-drag interactions can affect the viscosity of Q2D semi-diluted suspensions. [1] B. Cui, H. Diamant, B. Lin and S. Rice, Phys. Rev. Lett., vol. 92, 258301 (2004)

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Date submitted: 13 Nov 2007 Electronic form version 1.4