Abstract Submitted
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A numerical rheometer, or the time-dependent flow of dense suspensions[1] GUSTAF MÅRTENSSON, Chalmers University of Technology, Sweden, Micronic Mydata AB, Sweden, ANDREAS MARK, FREDRIK EDELVIK, Fraunhofer-Chalmers Research Centre, Sweden, LARS ESSÉN, Micronic Mydata AB, Sweden — The ability to perform numerical simulations of realistic flow situations is an ongoing area of research of importance in the realm of academia, as well as industry. The goal of this project is to perform a proof-of-concept calculation on the measurement of the rheological properties for a dense suspension. The following measurement methods were chosen for evaluation: a) Couette rheometry, b) parallel plate rheometry and c) axial piezo-rheometry. In the case of Couette and parallel plate rheometry, the rotational motion of the cylinder or plate is controlled with respect to the rotational rate or induced strain, whereafter a torsional moment is measured. For the piezo-rheometry, the stress mode is in the normal direction with respect to the plate and a stress response is measured. Experimental data for a number of model fluids is used for validation The simulations are performed with IBOFlow, the multi phase flow solver developed at Fraunhofer-Chalmers Centre. The granular-suspension is modelled by a two-fluid model discretized in an Euler-Euler framework. From the simulations it is concluded that the proposed granular model accurately models the rheology of the general flux and that the relaxation time may vary from case to case.

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