

Rheology of Heavy Mineral Slurries

Supervisor: A/Prof Q. Dzuy Nguyen

Nature of work: Experiments

Area: Chemical Engineering

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Brief description: Many mineral processing operations involve slurries of high-density solid particles which tend to settle rapidly under gravity. Design and control of process equipment, such as autoclaves, pumps and pipelines, for these slurries rely on good knowledge of the rheological properties of the slurries under the actual process conditions. We have recently developed a continuous flow rheometer that is capable of accurately measuring the flow properties of settling slurries. The rheometer, designed based on the principle of helical flow, consists of a concentric cylindrical system with the inner cylinder rotating and with an axial flow through the annular gap. From the measurable quantities, viz. rotating speed of the inner cylinder, torque, pressure gradient and axial flow rate, the basic rheological properties can be determined using a data reduction method previously developed. In this project, you will use the flow rheometer to systematically investigate the physical factors that affect the rheological behaviour of heavy settling slurries, such as particle concentration, density, size and size distribution and shape. The results obtained will be used to develop a rheological model for settling slurries that can be applied to designing and optimisation of pipeline transport system for mineral slurries.

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