be easily determined using Newtonian fluids alone. It is shown that the Debex on-line viscometer gives flow curves very similar to a conventional laboratory viscometer when this procedure is applied.

Rheological characterization of mineral suspensions using a vibrating sphere and a rotational viscometer

Kawatra S.K., Bakshi A.K. & Miller T.E. Jr, *International Journal of Mineral Processing*, 1996, 44-45/- (155-165). In English.

A new technique has been developed for the characterization of the rheology of mineral slurries into Newtonian and non-Newtonian flows. It utilizes a rotating type viscometer to measure apparent viscosity at a low shear rate, and a vibrating sphere type viscometer to measure the apparent viscosity at a high shear rate. Special precautions were taken to allow measurements of apparent viscosity of rapidly setting mineral suspensions. Both the viscometers are able to measure apparent viscosity as low as one mPa.s (millipascal-seconds) (1 mPa.s = 1 centipoise), which is the approximate room temperature viscosity of water.

Swirl flow characteristics and froth phase features in air-sparged hydrocyclone flotation as revealed by X-ray CT analysis

Das A. & Miller J.D., *International Journal of Mineral Processing*, 1996, 47/3-4 (251-274). In English.

The time-averaged multiphase flow characteristics of air-sparged hydrocyclone flotation have been studied using X-ray computed tomography. Criteria of froth stability and the relationship between froth phase features and flotation response have been established. Quantification of the spatial extent of the different flow regimes has been done in order to characterize the flow behavior during steady-state operation of a nominal 2-inch diameter air-sparged hydrocylone (ASH-2C). The influence of different operating and design variables on multiphase flow characteristics has also been established.

On-line measurement of viscosity and determination of flow types for mineral suspensions

Kawatra S.K. & Bakshi A.K., *International Journal of Mineral Processing*, 1996, 47/3-4 (275-283). In English.

A viscometry system involving a vibrating sphere viscometer and a rotational viscometer has been developed for on-line measurement of viscosity, and for rheological characterization of mineral slurries into either Newtonian or non-Newtonian flows. Both the viscometers were able to measure viscosity as low as one centipoise, which is the approximate room temperature viscosity of water. Ground silica of 80% passing 65 μm size was suspended in water, and was used to prepare slurries at different percent solids. Viscosity of each slurry sample was measured simultaneously by both the viscometers, and the results were compared to determine the rheological characters of the slurries. With this technique, it was found that all the silica slurry samples (up to 70 wt% solids) at the given size distribution were in the Newtonian flow regime.

Some characteristics of air-water two-phase flow in small diameter vertical tubes

Mishima K. & Hibiki T., *International Journal of Multiphase Flow*, 1996, 22/4 (703-712). In English.

Flow regime, void fraction, rise velocity of slug bubbles and frictional pressure loss were measured for air-water flows in capillary tubes with inner diameters in the range from 1 to 4 mm. Although some flow regimes peculiar to capillary tubes were observed in addition to commonly observed ones, overall trends of the boundaries between flow regimes were predicted well by Mishima-Ishii's model. The void fraction was correlated well by the drift flux model with a new equation for the distribution parameter as a function of inner diameter.

A computer based hot-film technique used for flow measurements in a vertical kerosene-water pipe flow

Farrar B. & Bruun H.H., *International Journal of Multiphase Flow*, 1996, 22/4 (733-751). In English.

This paper presents the application of a hot-film anemometer based two-phase flow measurement technique to the investigation of the structure of a vertical pipe flow of a water-kerosene mixture. Experiments were carried out within the bubbly flow, spherical cap bubble and churn flow regimes. The results obtained show that the radial profile of the local volume fraction is uniform at low volumetric quality, β, but becomes wall peaked as β increases. The average oil drop size is uniform across the pipe and independent of β for values of β below 15%, but at higher values the drop size increases in the central region of the pipe.

Design of a flow metering process for two-phase dispersed flows

Boyer C. & Lemonnier H., *International Journal of Multiphase Flow*, 1996, 22/4 (713-732). In English.

This paper describes the methodology used to conceive and size a flowmeter for two-phase dispersed flows. The Venturi having been chosen as the velocity measurement device, focuses on its measurement sensitivity to the velocity slip between the phases at the throat. Among the different two-phase flow models reviewed, an original one has been selected and adapted to predict; velocity and pressure distributions along a Venturi tube with air/water and oil/water flows. Bubble and liquid velocity calculations performed by this model are compared with experimental data to show a good agreement between predicted and measured velocities at the throat.

Experimental study of a two-phase bubbly flow in a flat duct symmetric sudden expansion - part II: liquid and bubble velocities, bubble sizes

Aloui F. & Souhar M., *International Journal of Multiphase Flow*, 1996, 22/5 (849-861). In English.

Experimental results obtained in a gas-liquid bubbly flow in a flat horizontal sudden expansion are presented in this study and constitute useful data for the numerical code. The use of hot film anemometry in the continuous phase (liquid) of a bubbly flow allows a determination of the average and fluctuating velocity. For the dispersed phase, the use of a double optical probe allows the determination of the average and fluctuating axial velocity and the granulometry of the bubbles. A comparison of these quantities with the results obtained by a fast video camera shows very good agreement.

Relation of slug stability to shedding rate

Woods B.D. & Hanratty T.J., *International Journal of Multiphase Flow*, 1996, 22/5 (809-828). In English.