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.

Measurements are presented for the shedding rate of liquid from slugs created by the flow of air and water in a horizontal 0.0953 m pipe at atmospheric conditions. These are used to predict a critical liquid carpet height below which slugs will decay. Of particular interest is the finding that the initiation of the slug flow regime at high gas flows is related to the stability of slugs, rather than the stability of a stratified flow.

Characterization of two-phase flows using fractal analysis of local temperature fluctuations
Kozma R., Kok H., Sakuma M., Djainal D.D. & Kitamura M., *International Journal of Multiphase Flow*, 1996, 22/5 (953-968). In English.

This works deals with the characteristics of two-phase flows based on fractal techniques in order to develop objective flow regime indicators. The fractal dimension of measured time series have been evaluated by Higuchi's method. It is shown that the error of the linear fit of the fractal dimension is a sensitive indicator of the changes in the flow regime, while the fractal dimension value itself is less suitable for flow regime identification. The developed method has been applied to the evaluation of two-phase flow experiments at the SIDAS boiling loop.

Experimental study of a two-phase bubbly flow in a flat duct symmetric sudden expansion - part 1. visualization, pressure and void fraction
Aloui F. & Souhar M., *International Journal of Multiphase Flow*, 1996, 22/4 (651-665). In English.

The present work involves an experimental study of bubble flow in a flat horizontal sudden expansion. This study consists of two parts which are interdependent and complementary. Here in the first part, the qualitative study by visualization shows that the bubble flow changes from a dissymmetric configuration to a symmetric configuration beyond a certain volumetric quality.

A first order relaxation model for the prediction of the local interfacial area density in two-phase flows
Millies M., Drew D.A. & Lahey R.T. Jr, *International Journal of Multiphase Flow*, 1996, 22/6 (1073-1104). In English.

It is the purpose of this paper to present a first order relaxation model which is derived from the Boltzmann transport equation, and which accurately describes the evolution of interfacial area density for bubbly flows. In particular, the local, instantaneous interfacial area densities and volume fractions are predicted for vertical flow of a vapor/liquid bubbly flow involving both bubble clusters and individual bubbles.

An interfacial friction correlation for shell-side vertical two-phase cross-flow past horizontal in-line and staggered tube bundles
Rahman F.H., Gebbie J.G. & Jensen M.K., *International Journal of Multiphase Flow*, 1996, 22/4 (753-766). In English.

A correlation is presented for the interfacial friction factor between the gaseous and liquid phases in vertical two-phase flows past horizontal in-line and staggered tube bundles. The interfacial friction data were determined from pressure drop, void fraction, and mass flux data taken by Dowlati et al. (1990, 1992b) and Schrage et al. (1988). These data were correlated using two non-dimensional quantities: a Reynolds number based on the mixture density and relative velocity between the two phases, and the porosity of the tube bundle.

Two-phase stratified flow splitting at a T-junction with an inclined branch arm
Penmatcha V.R., Ashton P.J. & Shoham O., *International Journal of Multiphase Flow*, 1996, 22/6 (1105-1122). In English.

The objective of this study is to investigate, experimentally and theoretically, two-phase splitting under stratified wavy flow conditions at a regular horizontal T-junction with an inclined branch arm. Experimental data reveals that gravity forces have a significant effect on the flow splitting. For downward inclination of the side arm more liquid is diverted into the branch arm, as compared to the case in which the side arm was horizontal. A mechanistic model has been developed for the prediction of the splitting phenomenon for both the horizontal and the downward orientations of the side arm. The model is based on the momentum equations applied for the separation streamlines of the gas phase and the liquid phase. Very good agreement is observed between the prediction of the model and the data acquired for all the cases.

Large eddy simulation of particle deposition in a vertical turbulent channel flow
Wang Q. & Squires K.D., *International Journal of Multiphase Flow*, 1996, 22/4 (667-683). In English.

The deposition of particles in fully-developed turbulent channel flow has been calculated using large eddy simulation of the incompressible Navier-Stokes equations. Calculations were performed for Reynolds numbers of 11 160 and 79 400 (based on bulk velocity and hydraulic diameter); subgrid-scale stresses were parameterized using the dynamic eddy viscosity model. Particle motion was governed by both drag and lift. The effect of particle-particle interactions as well as modification of the turbulent carrier flow by the particles was neglected.

Bottom bed regimes in a circulating fluidized bed boiler
Svensson A., Johnsson F. & Leckner B., *International Journal of Multiphase Flow*, 1996, 22/6 (1187-1204). In English.

This paper extends previous work on the fluidization regimes of the bottom bed of circulating fluidized bed (CFB) boilers. Pressure measurements were performed to obtain the time-averaged bottom bed voidage and to study the bed pressure fluctuations. Two bubbling regimes were identified: a 'single bubble regime' with large single bubbles present at low fluidization velocities, and, at high fluidization velocities, an 'exploding bubble regime' with bubbles often stretching all the way from the air distributor to the surface of the bottom bed. The exploding bubble regime results in a high through-flow of gas, indirectly seen from the low average voidage of the bottom bed, which is similar to that of a stationary fluidized bed boiler, despite the higher gas velocities in the