

A method to investigate filtration by the use of a pressure test filter

Palica M., *Chemical Engineering and Processing*, 1996, 35/5 (333-342). In English.

The article describes filtration investigations on a laboratory scale by the use of a pressure test filter. It enables the estimation of filtration constants, compressibility coefficient of the final product and dewatering in a cake compression zone. A method of experimental treatment of data was proposed for particular slurries based on constants K or modified constants K' of the characteristic filtration equation. The use of a pressure test filter makes it possible to reduce the investigation time, reduce the costs and approximate the results for other process conditions.

On the modelling of particle-body interactions in Stokes flows involving a sphere and circular disc or a torus and circular cylinder using point singularities

O'Neill M.E., *Chemical Engineering Communications*, 1996, 148-150/- (161-182). In English.

Exact solutions for the three-dimensional Stokeslet and rotlet placed axisymmetrically along the axis of a circular disc are found and combined with Brenner's first order interaction formulae to determine the effect of the presence of the disc on the force and torque acting on a particle whose dimensions are small compared with its distance from the disc. The results are compared with those of a full numerical integration of the Stokes equations for a sphere translating towards a disc. Brenner's first order wall correction theory is applied to the motion of a particle in a circular cylinder using the exact solutions for a torus translating or rotating in isolation. The theoretical predictions for the drag on a torus settling symmetrically in a circular cylinder are compared with those determined experimentally.

Rapid characterization of flow regimes in multiphase reactors through box-counting dimensions with an embedding dimension of two

Briens C.L., Hudson C. & Briens L.A., *Chemical Engineering Journal*, 1996, 64/1 (169-178). In English.

The performance of multiphase reactors is greatly affected by their flow regime. The box-counting dimension of a probe signal characterizes its intrinsic, dimensionless structure and is not significantly affected by moderate changes in probe calibration constants. This study uses an approximate box-counting dimension which is so rapidly calculated that it could be used for on-line control. The box-counting dimension of the raw signal from a bubble probe allows the accurate detection of gas maldistribution in bubble columns and of liquid maldistribution in bubble columns and gas-liquid-solid fluidized beds. The fluidization regime of liquid-solid and gas-liquid-solid beds can be accurately identified from the box-counting dimension of the signal recorded with either local probes or cross-sectional probes.

Numerical modelling of the mixing of viscoplastic slurries in a twin-blade planetary mixer

Tanguy P.A., Bertrand F., Labrie R. & Brito-De La Fuente E., *Chemical Engineering Research and Design*, 1996, 74/A4 (499-504). In English.

Slurries are known to exhibit stiff non-Newtonian properties, in particular yield stress and, from an engineering standpoint, their rheology can be well described by the Bingham model. In industry, the design of the slurry make-down process is a difficult and costly task. The flow of such materials in a twin-blade vertical planetary mixer is studied using 3D computer simulation. The flow structures and the power consumption are investigated for various values of the Bingham number.

Hydrodynamic characteristics of two-phase flow through fixed beds: air Newtonian and non-Newtonian liquids

Iliuta, I., Thyron F.C. & Muntean O., *Chemical Engineering Science*, 1996, 51/22 (4987-4995). In English.

An experimental investigation was carried out to determine the effects of gas and liquid flow rates and flow consistency index on the liquid-phase axial dispersion coefficient, pressure drop and the liquid holdup for two-phase downflow and upflow in a fixed bed. Water and non-Newtonian liquids were employed as liquid phase. The liquid-phase flow in a fixed bed was examined using the piston-diffusion-exchange (PDE) model. The time-domain analysis of tracer response data was used for the flow model parameter estimation.

Size, structure and dynamics of 'large' bubbles in a two-dimensional slurry bubble column

De Swart J.W.A., Van Vliet R.E. & Krishna R., *Chemical Engineering Science*, 1996, 51/20 (4619-4629). In English.

This paper reports preliminary results of a study on the hydrodynamics of a two-dimensional slurry bubble column. Experiments have been carried out with air/paraffin oil slurries with solids concentrations of 0, 28.3 and 38.6 vol% of porous silica particles (mean diameter of 38 μm). Bubble sizes, bubble coalescence and bubble break-up rates were determined by video image analysis. A population model for mass transfer has been set up and used to establish that frequent bubble-bubble interactions could lead to an order of magnitude increase in the mass transfer rates for the large bubble class.

Hydrodynamic and kinetic modelling of circulating fluidized bed reactors applied to a modified Claus plant

Puchyr D.M.J., Mehrotra K., Behie L.A. & Kalogerakis N., *Chemical Engineering Science*, 1996, 51/24 (5251-5262). In English.

Simulations of circulating fluidized-bed (CFB) reactors applied to the modified Claus process were performed to assess their potential for eliminating the costly tail gas clean-up unit (TGCU) from a Claus plant. The TGCU could be eliminated by achieving very high H_2S conversions in the catalytic reactors. Both the CFB regimes of pneumatic transport and fast fluidization were examined. Moreover, a newly developed CFB model accounting for the downflow of both the gas and solids in the annulus was applied to the fast fluidization regime. Recently published intrinsic reaction kinetics were employed for the hydrolysis of the problematic COS and CS_2 compounds on the Kaiser 201 alumina catalyst.