

ferently with gas velocity and fraction of coarse particles in bubbling and turbulent fluidization regimes. As a quantitative measure for describing the complexity or the self-affine property of the time series signals, a fractal analysis was introduced and related to the hydrodynamics of the fluidized beds. A correlation to predict the transition velocity of a binary solids fluidized bed was also developed in this paper.

Effect of packed bed on mass transfer in external-loop airlift bubble column

Okada K., Nagata Y. & Akagi Y., *Journal of Chemical Engineering of Japan*, 1996, 29/4 (582-587). In English.

The influence of packed bed set in the riser section on the liquid-side volumetric mass transfer coefficient (K_{LaR}) in an external-loop airlift bubble column was examined with water, 20 wt% glycerol, 10 wt% ethanol and 0.3 wt% CMC aqueous solutions. Bubble size, bubble rise velocity and gas holdup in the riser were measured to examine the effect of the packed bed using an optical fiber two-phase flow system. The presence of the packed bed in the riser increased the K_{LaR} values for the liquids used. This was associated with the increase in the specific gas-liquid interfacial area due to bubble breakage by the packed bed. A correlation equation for K_{LaR} was proposed for both types of airlift bubble columns with and without the packed bed.

Predictions of gas hold-up and liquid velocity in airlift reactors using two-phase flow friction coefficients

Garcia-Calvo E. & Leton P., *Journal of Chemical Technology and Biotechnology*, 1996, 67/4 (388-396). In English.

The overall friction coefficient of airlift reactors was estimated using equivalent lengths and friction factors. The friction factor was calculated taking into account the riser liquid velocity profile corresponding to the two-phase flow and using classical one-phase equations. A previously described model was used to obtain simultaneously both gas hold-up and liquid circulation velocity. The model simulates experimental data obtained in a wide range of configurations of internal and external airlift reactors with Newtonian and non-Newtonian systems.

Computational methods for multiphase flow and reactive transport problems arising in subsurface contaminant remediation

Arbogast T., Bryant S., Dawson C., Saaf F., Chong Wang & Wheeler M., *Journal of Computational and Applied Mathematics*, 1996, 74/1-2 (19-32). In English.

A mathematical formulation and some numerical approximation techniques are described for a system of coupled partial differential and algebraic equations describing multiphase flow, transport and interactions of chemical species in the subsurface. A parallel simulator PARSIM has been developed based on these approximation techniques and is being used to study contaminant remediation strategies. Numerical results for a highly complex geochemistry problem involving strontium disposal in a pit at Oak Ridge National Laboratory are presented.

Influence of particle size, fluidization velocity and relative humidity on fluidized bed electrostatics

Guardiola J., Rojo V. & Ramos G., *Journal of Electrostatics*, 1996, 37/1-2 (1-20). In English.

The influence of particle size, fluidization velocity, and relative humidity on the degree of electrification reached by a fluidized bed of glass beads has been studied. The static electrification of the bed was measured by means of the potential difference observed between an electric probe and the metallic distributor. The effect of relative humidity appears to be complex and is connected with the quality of fluidization existing in the bed. A characteristic curve for electrification vs. humidity has been proposed that consists of five zones. When the value of the relative humidity is lower than a critical value (RH_c), the static electrification of the bed cannot be measured accurately because the adhesion of particles to the probe leads to irreproducible voltage values. The degree of electrification increases with particle size and air velocity. The relationship between the average solid circulation velocity and electrification is studied.

Interaction of single travelling bubbles with the boundary layer and attached cavitation

Chih-Yang Li & Ceccio S.L., *Journal of Fluid Mechanics*, 1996, 322/- (329-353). In English.

Individual travelling cavitation bubbles were examined as they interacted with the flow over a two-dimensional hydrofoil. Each bubble was produced from a single nucleus created upstream of the hydrofoil, and the flow near the hydrofoil was visualized using particle imaging velocimetry (PIV). Travelling bubbles were observed to generate a local region of turbulence as they passed close to an unstable laminar boundary layer. By producing a locally turbulent region, the bubbles could temporarily sweep away a portion of attached cavitation at the foil midchord. Also, the bubbles were observed to strongly interact with a turbulent boundary layer, producing local regions of patch cavitation.

On general transformations and variational principles for the magnetohydrodynamics of ideal fluids. Part 2. Stability criteria for two-dimensional flows

Vladimirov V.A., Moffatt H.K. & Ilin K.I., *Journal of Fluid Mechanics*, 1996, 329/- (187-205). In English.

The techniques developed in Part 1 of the present series are here applied to two-dimensional solutions of the equations governing the magnetohydrodynamics of ideal incompressible fluids. We first demonstrate an isomorphism between such flows and the flow of a stratified fluid subjected to a field of force that we describe as pseudo-gravitational. We then construct a general Casimir as an integral of an arbitrary function of two conserved fields, namely the vector potential of the magnetic field, and the analogous potential of the modified vorticity field.

Concentration waves and the instability of bubbly flows

Lammers J.H. & Biesheuvel A., *Journal of Fluid Mechanics*, 1996, 328/- (67-93). In English.

This paper examines whether G.K. Batchelor's (1988) theory of the propagation of planar concentration disturbances and the occurrence of instabilities in uniform fluidized beds can be applied to bubbly flows. Experi-