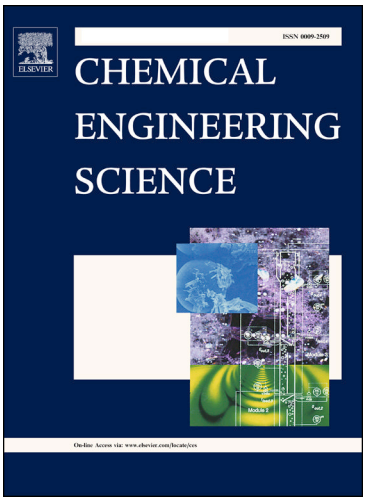

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Estimating the hindered-settling flux function from a batch test in a cone

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Abstract

The hindered-settling velocity function for the modelling, simulation and control of secondary settling tanks can be determined from batch tests. The conventional method is to measure the velocity of the descending sludge-supernatant interface (sludge blanket) as the change in height over time in a vessel with constant cross-sectional area. Each such experiment provides one point on the flux curve since, under idealizing assumptions (monodisperse suspension, no wall-effects), the concentration of sludge remains constant just below the sludge blanket until some wave from the bottom reaches it. A newly developed method of estimation, based on the theory of nonlinear hyperbolic partial differential equations, is applied to both synthetic and experimental data. The method demonstrates that a substantial portion of the flux function may be estimated from a single batch test in a conical vessel. The new method takes into consideration that during an ideal settling experiment in a cone, the concentration just below the sludge blanket increases with time since the mass of suspended solids occupy a reduced volume over time.

Keywords: identification, inverse problem, partial differential equation, sedimentation

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