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Flux identification and efficient numerical simulation of clarifier-thickener units.*

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Abstract

Mathematical models for the simulation of batch settling and continuous clarifier-thickeners can usually be expressed as a convection-diffusion partial differential equation (PDE). Reliable numerical methods require that the nonlinear flux function of this PDE has been identified for a given material. This contribution simulates a continuous process of thickening with a numerical model adapted from wasterwater treatment [2], that involves a discontinuous flux. Results are compared with experimental data from JRI labs, a consulting of copper mining specialised in thickener process and unit areas. This contribution is an extension of [1] and is based on the treatment of an inverse problem published by R. Bürger and S. Diehl in [3] for the flux identification in the case of a suspension that shows no sediment compressibility. Moreover, we present a simulation of the complete process based on experimental data obtained from a batch settling test. The experimental information determines the choice of the batch flux density function. We then proceed to solve the associated problem by Godunov's first-order method.

Key words: Continuous sedimentation, simulation model, Solid-liquid separation, Flux identification.

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