

Abstract Submitted
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Dewatering saturated, networked suspensions with a screw press

TOM EAVES, DANIEL PATERSON, University of British Columbia, DUNCAN HEWITT, University of Cambridge, NEIL BALMFORTH, MARK MARTINEZ, University of British Columbia — A model is presented for the dewatering of a saturated two-phase porous medium in a screw press. The model accounts for the detailed two-phase rheological behaviour of the pressed material and splits the press into two zones, an initial well-mixed constant-pressure region followed by an axial transport region in which the total pressure steadily increases. In this latter region, a slowly-varying helical coordinate transformation reduces the dynamics to an annular bi-axial compression of the two-phase porous medium. Unlike previous modeling, the transition point between the two zones is determined self consistently, rather than set a priori, and the pressure along the length of the press is deduced from the rheology of the two-phase flow rather than averaging the two-phase dynamics over a cross-section of the press. The model is compared to experimental observations of the dewatering of a paper-making fibre suspension and of a clay slurry, and is shown to reproduce operational data.

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