

Abstract Submitted
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Shallow flow down a spiral channel of small torsion and rectangular cross section¹ YVONNE STOKES, HAYDEN TRONNOLONE, The University of Adelaide, STEPHEN WILSON, BRIAN DUFFY, University of Strathclyde Glasgow — Motivated by a desire to understand better the operation of spiral gravity separators, we consider flow of small depth down a helically wound channel of small torsion and rectangular cross section. The small fluid depth makes experimental investigation difficult, so that mathematical modelling and theoretical and computational studies are of great value for determining how such flows are influenced by fluid properties and geometrical parameters. We present a thin-film model, comprised of a system of non-linear ordinary differential equations, and show that there is a limiting value of a dimensionless parameter, defined in terms of fluid properties and geometrical parameters, beyond which there is no physically meaningful solution. Thin-film model solutions are compared with numerical solutions of a PDE model that does not assume small fluid depth.

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