Abstract Submitted
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Non-Boussinesq axisymmetric gravity currents at high Re MARIUS UNGARISH, Technion, Haifa, Israel — The propagation of a non-Boussinesq gravity current in an axisymmetric configuration (full cylinder or wedge) is considered. The current of density ρ_c is released from rest from a lock of radius r_0 and height h_0 into an ambient fluid of density ρ_a in a container of height H, adjacent to the horizontal boundary on which propagation occurs. When the Reynolds number Re is large, the resulting flow is governed by the parameters ρ_c/ρ_a and $H^* = H/h_0$. We show that the shallow-water one layer model, carefully combined with a Benjamin-type front condition, provides a versatile formulation for the thickness and speed of the current, for a wide range of the parameters, without any adjustable constants. (The Boussinesq currents are just a small subdomain about $\rho_c/\rho_a = 1$ of this solution). Comparisons with Navier-Stokes solutions and differences with the 2D rectangular counterpart (Ungarish, J. Fluid Mech. 579, 373-382, 2007) are discussed.

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