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**Front conditions for gravity currents in channels of general cross-section: some general conclusions** MARIUS UNGARISH, Technion, Israel Institute of Technology — We consider the propagation of a high-Reynolds-number gravity current in a horizontal channel with general cross-section of width $f(z), 0 \leq z \leq H$; the gravity acceleration $g$ acts in $-z$ direction. (The rectangular case is $f(z) = \text{const.}$) We assume a two-layer system of fluids of densities $\rho_c$ (current, of height $h$) and $\rho_a$ (ambient, filling the remaining part of the channel). We revisit the derivation of the nose Froude-number condition $Fr = U/(g'h)^{1/2}$; $U$ is the speed of propagation of the current and $g' = (\rho_c/\rho_a - 1)g$. We present compact insightful expressions of $Fr$ and energy dissipation as a functions of $\varphi$ (= area fraction occupied by the current in the cross-section), and show that a degree of freedom is present. We demonstrate that the extension of the closure suggested by Benjamin for the rectangular cross-section, namely that the bottom is a perfect stagnation line, produces $Fr$ solutions which are optimal with respect to several useful criteria. However, the energy conserving closure yields problematic $Fr$ results, as manifest in particular by invalidity for deep currents (small $h/H$). Connection with realistic time-dependent gravity currents is discussed.

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