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Can Diffuse Methods be Tolerated in Numerical Predictions of Interfacial Instability? SUTHEE WIRI, THEO THEOFANOUS, ROBERT NOURGALIEV, MENG SING LIOU — The role of interfacial smearing in numerical simulations of interfacial instability is addressed by means of Orr-Sommerfeld type analysis of two stratified fluid flow problems; one involving a perfectly sharp interface, and one in which the jumps in viscosity and/or density are smeared over an interfacial region- parameterized by shape and steepness. The results, confirmed by direct numerical simulations that fully account for the (jump) boundary conditions, demonstrate that a sharp interface in shear-dominated flows is physically unique and its instability behavior cannot be matched however steep a discontinuity-smearing is employed. Moreover we conclude that in such cases the results of smearing are inherently non-convergent, and that consequently such results cannot be regarded as products of direct numerical simulations.

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