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Three dimensional spatio-temporal instabilities in two-layer flows at high Reynolds numbers[1] PRASHANT VALLURI, University of Edinburgh, LENNON O'NA'RAIGH, University College Dublin, PETER SPELT, Imperial College London — Interfacial instabilities in Newtonian two-layer flows are investigated via three-dimensional direct numerical simulations using the diffuse-interface method to capture the interface. The simulations study the effect of waves, generated by a random 3D noise, at the inlet on the spatio-temporal behaviour of the instabilities. Of specific interest are the conditions of growth/decay of the spanwise interfacial perturbation. Preliminary results show a sustained growth of the spanwise mode, irrespective of the primary streamwise mode, at various streamwise locations in the domain. At positions close to the inlet the spanwise wave grows linearly until a nonlinear distortion which eventually saturates the amplitude. This work extends our recently reported two-dimensional studies on spatiotemporal interfacial instabilities (J. Fluid Mech. (2010), vol. 656, pp. 458–480) to i) three dimensions and ii) higher Reynolds numbers.

[1]HECToR Supercomputing

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