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**Modeling of the stability of free-falling liquid curtain flow** FORTUNATO DE ROSA, Universita di Napoli Federico II, Dept. of Aerospace Engineering DIAS, Italy, GENNARO COPPOLA, Universita di Napoli Federico II, Dept. of Energetics and Applied Thermo-fluid-dynamics DETEC, Italy, LUIGI DE LUCA, Universita di Napoli Federico II, Dept. of Aerospace Engineering DIAS, Italy — The physical mechanisms leading to the disintegration of a gravitational (non parallel) two-dimensional plane liquid curtain (sheet), occurring at low fluid flow rates, are not yet fully known. The problem is reconsidered here through the development of an unsteady inviscid mathematical model where the dependent variables are expressed by means of polynomial expansions in terms of powers of the local lateral distance from the centerline position. Surface tension effects are included, and the ambient pressure field may be either applied or induced by the compliant free interface. The linearization around the base flow allows the separation of sinuous and varicose responses. The global linear stability of such a model is analyzed by inspecting both modal and non-modal amplifications of disturbances energy. An equation of energy budget is also derived, which is used to estimate the contribution of the various physical effects evaluated via direct numerical simulations of the governing system of equations.

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