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Convective and Absolute Instability of Liquid Jets under Gravity Effects GHOBAD AMINI, MATTHIAS IHME, University of Michigan, Ann Arbor, ALI DOLATABADI, Concordia University — The break-up of liquid jets is of practical importance for several applications, including liquid-fuel-injection and ink-jet printing. In this work, the effect of gravity on the onset and growth rate of absolute and convective instabilities in liquid jets is studied. The mathematical problem is formulated in terms of quasi-one-dimensional equations, and the linearized stability equations are solved using a first-order perturbation method. An analytic form of the dispersion equation is derived, and the variation of the growth rate is investigated for a range of positive and negative Bond numbers, corresponding to downward-pointing and rising liquid jet. The critical Weber number, demarcating the transition between convective and absolute instability is determined as function of Reynolds and Froude numbers. Model-results for the limiting case of zero gravity are compared with classical results of Chandrasekhar and Leib & Goldstein, confirming the validity of this approach.

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