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Unconditional jetting[1] ALFONSO M. GANAN-CALVO, ESI, Universidad de Sevilla, 41092 Sevilla, Spain — It is well known that steady capillary jetting of a fluid dispersed into another immiscible continuum fluid phase is possible when surface tension forces are overcome by either inertia or viscous forces, depending on the flow Reynolds number. In terms of stability, it is necessary that the upstream component of the propagation speed of perturbations be smaller than the downstream convective jet velocity. The parametrical realm of the existence of capillary jetting is limited by the Capillary number as functions of the Reynolds number and the fluid properties ratios. These critical conditions are obtained when the so called upstream marginal stability velocity is set to zero. A detailed study of parametrical windows for steady capillary jetting reveals two distinguished, striking limits where the upstream marginal stability velocity is always positive (no signal is propagated upstream) independently of the issued liquid flow rate. In these rather ample limits, where the jet does not undergo the usual dripping-jetting transition, either the jet can be made arbitrarily thin (yielding droplets of any imaginably small size), or its bulk speed can be made zero. Those conditions are here analytically and experimentally analyzed for their particular technological relevance.

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