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Absolute-convective instability of coaxial jets CONRADO FERRERA, ETSI, Universidad de Extremadura, MIGUEL A. HERRADA, ESI, Universidad de Sevilla, JOSE M. MONTANERO, ETSI, Universidad de Extremadura, ALFONSO M. GANAN-CALVO, ESI, Universidad de Sevilla — A well established route for the massive microencapsulation of labile materials, microorganisms, pharmaceutical principles, flavors, or any active ingredients of any kind involves the generation and breakup of coaxial capillary jets. Here, surface tension is the ultimate molding mechanism, and therefore experience teaches that the product quality is optimized within operating condition ranges where Weber and Capillary numbers attain limited values. These ranges allow for a precise control of the product structure. However, surface tension also mandates whether compound capillary jets may form or not: Weber and Capillary numbers maps exhibit "hard" boundaries where jets become locally unstable (absolutely unstable) as opposed to convectively unstable, and the product shows dramatic changes in structure (generally a degradation) across these boundaries. In this work we perform a linear spatiotemporal analysis of coaxial capillary jets to provide cartographic maps of viable regions in the Weber and Capillary numbers space. A discussion on the connection of these maps with the morphology of the resulting products is also given, together with comparisons with published experimental literature.

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