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Stability and transition to chaos of regular capsule trains<sup>1</sup> SPENCER BRYNGELSON, JONATHAN FREUND, University of Illinois at Urbana-Champaign — Elastic capsules flowing in sufficiently narrow confines, such as red blood cells in capillaries, are well-known to line up in a single-file train. The stability of such a train in less confined environments, where this organization is not observed, is investigated in a model system that includes full coupling between the viscous flow and suspended elastic capsules. A rich set of linearly amplifying disturbances, including short- and long-time perturbations (non-modal and spectral, respectively) are identified and analyzed. Finite-amplitude transiently amplifying perturbations are shown to provide a mechanism that can bypass slower asymptotic modal linear growth and precipitate the onset of nonlinear dynamics. Direct numerical simulations are used to verify the linear analysis and track the subsequent transition of the regular capsule trains into an apparently chaotic flow.

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