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3-D Stability of a Draining Film Between Two Drops SUKHVINDER KAUR, Graduate Student, L. GARY LEAL, Professor — The drainage of a thin film between two drops in a flow has usually been treated as an axisymmetric deterministic problem. In this paper, we carry out a quasi-static 3-D linear stability analysis to determine the stability of the draining film to non-axisymmetric perturbations. The linear stability calculation is interfaced with the full axisymmetric calculation of two drops approaching in an external flow field in order to obtain the correct film shape at each time interval. We find that the first non-axisymmetric mode is the most unstable. Calculations show that while the critical thickness for rupture remains mostly unchanged, the growth rates change significantly when the interface is tangentially mobile. Finally, a comparison of the critical thickness for film rupture from the linear stability calculation with that from the axisymmetric full drop problem reveals the relative importance of non-axisymmetric rupture on the drainage time and conditions for coalescence.

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