

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

The Negligible Role of Thermal Inertia in the Marangoni Instability and Evaporation Instability Problems¹ JOHN SHREFLER, Univ of Florida - Gainesville, GEORG DIETZE, Univ. Paris-Sud, CNRS, Lab. FAST, RANGA NARAYANAN, Univ of Florida - Gainesville — The classical Marangoni instability problem, principally introduced by Pearson in 1958, takes the interface of two fluids heated from below to be non-deflecting and as a consequence of this assumption thermal inertia is responsible for the onset of convective flows. However, in practical problems where interfacial deflections are uncontrollable and necessarily present, we find that thermal inertia is of very little importance for a broad class of fluids. Neglecting the contribution of thermal inertia, we find that the instability persists as in the classical case. This is shown by way of an integral boundary layer method for long wavelength flows and confirmed by detailed calculations using the full equations. We aim to demonstrate that the principal result that thermal inertia is unimportant continues to hold for the evaporation instability problem, provided pure component phase change is considered.

¹Supported by NSF 0968313 and Marie Curie IRSES grants.

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Date submitted: 31 Jul 2015

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