Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Weakly nonlinear stability of Marangoni convection in a liquid bridge[1] KAORU FUJIMURA, Tottori University — Marangoni convection arising in a liquid column, bridging between concentric, circular parallel plates with different but uniform temperatures, is examined on its linear and weakly nonlinear stability. The analyses are conducted for small and moderate Prandtl numbers $0.001 \leq P \leq 10$. Our attention is focused on a relatively low liquid bridge with $h/r_0 = 1$ where h is the height and r_0 is the radius. The buoyancy effect is ignored and perfectly insulating condition is imposed on the surface of the liquid bridge. Linear stability analysis revealed that the critical condition was given by different azimuthal wavenumbers, $m = 1$, 2, and 3, depending on the Prandtl number. The critical condition is given by steady solutions for $0 < P < 0.0578$ and by oscillatory solutions for $P > 0.0578$. Weakly nonlinear analysis identifies the stable region of the secondary solutions bifurcating from the linear critical curve.

[1]Supported by Grant-in-Aid for scientific research (B) 21360101 and 2436007801.

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Date submitted: 23 Jul 2012 Electronic form version 1.4