Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

**Elasto-Capillary Coalescence of Multiple Parallel Sheets** AMIR GAT, MORTEZA GHARIB, California Institute of Technology — We analyzed two-dimensional clamped parallel elastic sheets which are partially immersed in liquid as a model for elasto-capillary coalescence. The existing literature studied this problem via minimal energy analysis of capillary and elastic energies of the post-coalescence state. Utilizing modal stability analysis and asymptotic analysis, we studied the stability of the configuration before the coalescence occurred. Our analysis revealed previously unreported relations between viscous forces, body forces, and the instability yielding the coalescence. A mathematical description of the process creating the hierarchical coalescence structure was obtained and yielded that the mean number of sheets per coalesced region is limited to the subset $2^N$ where $N$ is the set of natural numbers. Our results were compared with experimental data and a reasonable agreement was observed.

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Date submitted: 06 Jul 2012 Electronic form version 1.4