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**How to Maximize Self-Assembly in Free Surface Films by Resonant Wavelength Excitations** SANDRA TROIAN, NAN LIU, California Institute of Technology, MC 128-95, Pasadena, CA 91125 — Application of an external force probe on self-assembly processes in thin liquid films can offer significant insight into the fundamental dynamics of pattern formation. Less appreciated is the fact that modulation of such forces can induce resonant excitation effects in linearly unstable systems. While temporal modulation is rather common, there has been less emphasis on spatial forcing as a method for corralling emergent structure formation; such studies have also been strictly limited to 2D. In this talk, we call attention to a novel 3D hydrodynamic instability in nanoscale films whose free surface is exposed to a large uniform thermal gradient. Such films spontaneously develop arrays of nanopillars whose uniformity is often compromised by nanoscale inhomogeneities in film thickness, temperature and surface defects. In this talk we focus on resonant wavelength excitations induced by spatial modulation of the external thermal field near the linear stability point. Linear stability, weakly nonlinear analysis and simulations of the full nonlinear interface equation demonstrate the existence of a spatial coherence regime leading to more rapid growth and denser packing of perfectly uniform arrays, of significance to recent advances in lithographic patterning.

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