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**Coupling between short- and long-wavelength modes of interfacial instabilities** IMAN NEJATI, MATHIAS DIETZEL, STEFFEN HARDT, TU Darmstadt — The principles and behavior of (hydrodynamic) self-organizing systems (SOS) are well understood, whereas comparably few studies have addressed the coupling of such systems. Given that in a SOS the cooperative effects of subunits lead to the coherent behavior of the assembly (commonly revealed by the spontaneous generation of spatial and/or temporal patterns), interactions between individual SOS may give rise to collective behavior as well. Within this context an experimental analysis of two conjugated stacked liquid layers has been performed. The lower film is placed on a heated plate and is much thinner (less than 10 microns) than the upper one (a few hundred microns), which is situated under a cooled air layer. The films evolve according to coupled short- and long-wavelength (SW/LW) modes of interfacial instabilities. The liquid-liquid (L-L) interface is deformed by viscous stresses with the same wavelength as the hexagonal pattern emerging due to the SW-Bénard-Marangoni instability at the liquid-gas interface of the thicker layer. For gravity-inverted systems, the pattern symmetry is affected by the LW-Rayleigh-Taylor instability developing at the L-L interface, at least if the lower film is sufficiently thick (avoiding the stabilization by the disjoining pressure).

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