

Abstract Submitted
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Spontaneous generation of vortex crystals from forced 2-D homogeneous turbulence¹ JAVIER JIMÉNEZ, U. Politécnica Madrid, ALAN GUEGAN, École Polytechnique, Palaiseau — The long-term limit of statistically stationary two-dimensional turbulence is known to depend on the form of the large-scale forcing. That effect is studied systematically by continuously varying the forcing from deterministic to Brownian in direct numerical simulations in doubly-periodic boxes. As expected this switches on or off the enstrophy cascade and the presence of strong coherent structures, but the transition is not monotonic. Under intermediate forcing conditions, the flow evolves to a stationary vortex crystal with triangular lattice, which appears to be stable and to last indefinitely. Deterministic forcings frustrate crystallization through the formation of fast-moving dipoles, and very random ones melt the crystal. The relation with previous experimental observations in other 2D systems, such as highly magnetized plasmas and Bose-Einstein condensates, will be discussed.

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