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Self-sustained turbulence at the Kolmogorov Microscale. ASHLEY WILLIS, University of Sheffield, QIANG YANG, University of Warwick, YONGYUN HWANG, Imperial College London — Invariant solutions have been identified in shear flows that exist to as small as the Kolmogorov microscale, e.g. Deguchi (2015). For these solutions, which are steady in a moving frame, energy production and dissipation is in perfect balance. For developed turbulent flow, however, eddies at this scale are expected to be driven mainly by the energy cascade from larger scales. In this work we show that an energy production mechanism indeed exists at the Kolmogorov scale in simulations of turbulence. A uniform shear flow is generated in the Couette geometry by artificially limiting the spanwise dimension, where attached eddies are limited to this dimension. In a narrow periodic box of minimal spanwise wavelength, no scale separation exists between production and dissipation, as in transitional flow, and the self-sustaining mechanism is found to be consistent with the invariant solutions.

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