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Resonances in modulated turbulence WILLEM VAN DE WATER,
CARL TIPTON, Eindhoven University of Technology, P.O. Box 513 5600MB, Eindhoven, the Netherlands — The question is whether there exist preferred frequencies with which to periodically excite turbulence. The possibility of such a resonance is intriguing as one may object that turbulence does not have a single dominating timescale but a continuum of strongly fluctuating times. We present evidence for such a resonance in windtunnel experiments where turbulence is modulated using an active grid. This grid can be controlled such that both the temporal frequency and the symmetry of the imposed spatial pattern can be changed. The results highlight the importance of the spatial structure of the modulation and the way in which the turbulent response is characterized. These experiments have been inspired by numerical studies of simple turbulence models, but resonances are now also found in direct numerical simulations which completely resolve the velocity field.

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