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Stirring turbulence with turbulence WILLEM VAN DE WATER, HAKKI ERGUN CEKLI, RENE JOOSTEN, Physics Department, Eindhoven University of Technology, Postbus 513, 5600 MB Eindhoven, the Netherlands — We stir wind-tunnel turbulence with an active grid that consists of rods with attached vanes. The time-varying angle of these rods is controlled by random numbers. We study the response of turbulence on the statistical properties of these random numbers. The random numbers are generated by the Gledzer-Ohkitani-Yamada shell model, which is a simple dynamical model of turbulence that produces a velocity field displaying inertial-range scaling behavior. The range of scales can be adjusted by selection of shells. We find that the largest energy input and the smallest anisotropy are reached when the time scale of the random numbers matches that of the large eddies in the wind-tunnel turbulence. A large mismatch of these times creates a flow with interesting statistics, but it is not turbulence.

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