Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Stirring anisotropic turbulence with an active grid WILLEM VAN DE WATER, Delft University of Technology — The turbulent cascade restores isotropy, but may do that very slowly, so that even at large Reynolds numbers anisotropic stirring may be remembered at the small scales. Our active grid consists of a grid of rods with attached vanes that are rotated by servo motors. Homogeneous shear in a wind tunnel is created with a judicious choice of the axes motion protocol. We characterize turbulence using an array of 10 two-component hot wires. By changing the orientation of the array and selecting the components α, β of the velocity, structure functions $G_{\alpha^n,\beta^n}(\vec{r}) = \langle u_\alpha^n(\vec{x}+\vec{r})\, u_\beta^n(\vec{x})\rangle$ that vanish in isotropic turbulence could be measured. Their scaling anomaly appears to be surprisingly large. In a second experiment we drastically change the integral length scales and drastically change the stirring anisotropy by tuning the coherence time of the signals that drive the grid. Although the spectra remain turbulence-like, the large-scale anisotropy is imprinted on small scales.

H. E. Cekli and W. van de Water, Phys. Fluids **32**, 075119 (2020)

Willem Van De Water
Delft University of Technology

Date submitted: 03 Aug 2020 Electronic form version 1.4