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Turbulence of Dilute Polymer Solutions: Lagrangian Particle Tracking HAITAO XU, NICHOLAS OUELLETTE[1], EBERHARD BODENSCHATZ, MPI for Dynamics and Self-Organization, ICTR COLLABORATION —
We report measurements from particle tracking experiments of intense turbulence of a dilute polymer-water solution far away from the boundaries at Taylor microscale Reynolds numbers between 200 to 500. The turbulent water flows were created by inertial forcing using baffled disks or propellers in a Von Kármán swirling flow. For this forcing the effect of polymers on energy injection was observed to be negligible. For small polymer concentration, only the small-scale properties of turbulence were affected, whereas the inertial energy cascade was unchanged – the presence of polymers seems to introduce an additional energy dissipation mechanism. When the polymer concentration exceeded a threshold value, the large scales were affected as well, and the whole cascade was altered. The energy transfer rate decreased, and the Lagrangian acceleration correlations decayed oscillatorily.

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