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Sources and Sinks of Zonal Flow Shear in Tokamak Microturbulence.[1] ANDRIS DIMITS, DAN SHUMAKER, WILLIAM NEVINS, Lawrence Livermore National Laboratory — The relative contributions of various physics terms to the driving and damping of the zonal flows in gyrokinetic simulations of toroidal ion temperature gradient (ITG) turbulence are investigated using a specialized simulation diagnostic. The development and verification of this diagnostic, which directly evaluates contributions of the terms to the rate of change of the mean squared zonal flow shear, were presented previously (A.M. Dimits et al. APS-DPP02 meeting). We have found that in the turbulent finite-transport regime of toroidal ITG turbulence, the zonal flow shear is generated primarily through the Reynolds' stress term and dissipated by the transit-time damping terms. Application of an analogous diagnostic to experiments would require modification of the approach to use measurements of the flow field quantities in a small number of localized regions instead of over full flux-surfaces. Our simulations have addressed this by showing that useful zonal-flow-balance information can be obtained with as few as four poloidal samples.

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Andris Dimits
Lawrence Livermore National Laboratory

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