

# **Turbulent saturation of tokamak core zonal flows**

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Current theories of zonal flow generation and saturation focus on the radial transport of poloidal momentum. Different from a cylinder, stationary poloidal flows in a tokamak are accompanied by (possibly kinetic) return flows along the magnetic field, which cancel the flows' inherent divergence, maintaining incompressibility, and comprise the major part of the flow energy. In numerical ion temperature gradient turbulence studies, the turbulent diffusion of the parallel flow causes the flow saturation, whereas the poloidal momentum transport continues to strongly drive the flows.