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Numerical implementation of a local, δf gyrokinetic model for intrinsic rotation MICHAEL BARNES, FELIX PARRA, Massachusetts Institute of Technology — Sheared plasma rotation has been shown to reduce turbulent transport and improve plasma stability. Many fusion experiments induce strong rotation via direct external momentum injection, but large, dense devices such as ITER are not expected to have large external momentum input. However, Experiments on a range of fusion devices have demonstrated significant rotation in the absence of external momentum input. The details of this "intrinsic" rotation need to be understood so that we can determine if ITER and next generation fusion devices will benefit from rotational shear. Here we describe implementation of a local, δf gyrokinetic model for intrinsic rotation in `GS2`. This model self-consistently treats the finite ρ_* terms that are required to determine turbulent momentum fluxes in the absence of large mean plasma flows, flow shear, or up-down asymmetry. We present results from nonlinear gyrokinetic simulations demonstrating the fundamental symmetry of the gyrokinetic-Maxwell system that necessitates inclusion of finite ρ_* terms when studying intrinsic rotation. We also show how the amplitudes and wavelengths of turbulent fluctuations scale with important parameters such as the safety factor and temperature gradient, which validates the ordering used in our analytic model. Finally, we present preliminary momentum transport results from nonlinear simulations with the finite ρ_* terms included.

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