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Effect of magnetic shear on critically balanced ITG turbulence NOAH MANDELL, University of Maryland, MICHAEL BARNES, University of Texas, WILLIAM DORLAND, University of Maryland, FELIX PARRA[1], PETER CATTO, Massachusetts Institute of Technology — Critical balance provides a relation between the parallel and perpendicular scales in turbulence [1]. By assuming critical balance and that the maximum parallel correlation length of the turbulence is limited by the magnetic geometry, it is possible to find robust scalings for the maximum perpendicular eddy size and the saturation amplitude of the turbulence with some magnetic geometry parameters [1]. Using a newly developed gyrofluid code called GryfX, along with the gyrokinetic code GS2, we study the effect of magnetic shear on critical balance, the maximum parallel and perpendicular correlation lengths, and the saturation amplitude of the turbulence. This study also seeks to benchmark GryfX with GS2. GryfX runs on NVIDIA GPUs, giving it more than a 70 times performance advantage over a CPU gyrofluid code. Compared to a gyrokinetic code, GryfX also has the advantage of evolving only six moments as opposed to six hundred grid points in velocity space for a kinetic calculation. Combined, these two factors give a seven thousands times performance advantage that allows the use of GryfX to efficiently guide the choice of resolution and other parameters of interest for gyrokinetic simulations.

[1] Barnes et al, Phys. Rev. Lett. 107, 115003 (2011)

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