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2D Drift Wave Turbulence Solved With a Time-Spectral Method

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— Drift wave turbulence is a universal phenomena in fusion plasma devices, playing a major role for energy confinement. Associated numerical transport modelling poses a difficult task due to the strong non-linearity and chaotic behavior of the turbulence. In order to address the present excessive computational requirements, in particular the small time steps of explicit finite difference methods, a fully time-spectral method (GWRM) has been developed. The GWRM models the 2D spatial domains, *as well as the temporal domain*, using a weighted residual method for approximate solutions in the form of Chebyshev polynomial series. Thus the method gains spectral accuracy in all domains whilst being free of the CFL criteria. Successful benchmarking, employing the 2D Navier-Stokes equations, will be demonstrated for different boundary conditions. The GWRM is currently applied to a 2D fluid drift wave model developed by [1]. This two-fuid model describes fully toroidal ITG mode turbulence including FLR effects. Computational results will be presented and discussed. [1] H. Nordman and J. Weiland, Transport due to toroidal η_i mode turbulence in tokamaks, Nucl. Fusion, 29, 251, 1989.

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