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Learning mean field dynamics for drift wave turbulence[1] ROBIN HEINONEN, P. H. DIAMOND, University of California, San Diego — Drift wave turbulence in confined plasma features the nonlinear interaction and self-consistent evolution of the pressure profile, zonal flow field, and turbulence intensity field. The profile drives the turbulence via linear instability, which then both drives the zonal flow via modulational instability and evolves the profile via turbulent transport. The zonal flow, in turn, feeds back on the turbulence via shear suppression. Closing a mean-field model for this system requires the challenging task of evaluating the turbulent fluxes due to cross-correlations between fluctuating quantities. In this work, we examine this system in the context of a Hasegawa-Wakatani model and use a supervised learning approach to learn a mean-field model for the turbulent fluxes. Results are presented and compared to analytical calculation. The results demonstrate the importance of the frequency shift due to the mean vorticity gradient, which is neglected in most studies.

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