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Plasma microturbulence with dual drive F. MERZ, M. KAMMERER, F. JENKO — Turbulence driven by ITG modes and trapped electron modes (TEMs) is generally considered the key mechanism for anomalous transport in fusion devices on ion scales. But while there exist many theoretical studies of pure ITG turbulence, not much is presently known about the properties of pure TEM turbulence and about possible nonlinear interactions between ITG modes and TEMs. These important questions will be addressed here by means of nonlinear gyrokinetic simulations with the Gene code. We find that temperature gradient driven TEM turbulence – in contrast to ITG turbulence – does not saturate via zonal flow generation. Instead, the transport dominating modes in the k_y spectrum largely resemble the respective linear microinstabilities, and the action of the nonlinearity on long-wavelength TEMs is statistically equivalent to that of a diffusion operator. This is the basis for a rather simple transport model which is able to capture many features observed in the nonlinear simulations. In order to be able to examine the coexistence of TEM and ITG instabilities in certain regions of parameter space, Gene has been extended by an eigenvalue solver which is capable of dealing with the very large matrices that occur in this context. Thus it becomes possible to detect and analyze also subdominant modes, and to relate their characteristics to those of the corresponding turbulent system. The nature of a dual turbulence drive and the consequences for transport modelling will be discussed.

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