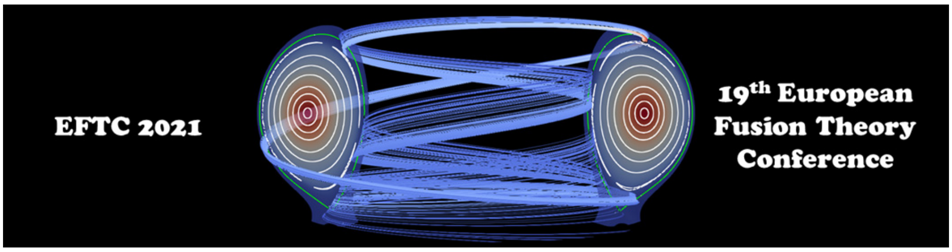


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# Simulation of microturbulence in magnetised plasma with heat sources using a delta-f gyrokinetic approach with an evolving background Maxwellian

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The assumption of a small relative deviation from background f_0 under the delta-f scheme often used to simulate the plasma core will not be valid when simulating the plasma edge, characterized by low density and temperature and strong gradients. In order to retain the noise reduction benefit of the delta-f scheme as compared to the full-f approach, a study of a transition scheme by means of a time-dependent temperature profile in the background Maxwellian is done. This profile is adapted by locally relaxing the kinetic energy accumulating in the deviation to the background component of the distribution function. The background distribution f_0 becomes time-dependent, with an adaptation rate that is specified as a free parameter. To this end, simulations of a simplified system mimicking the plasma edge are run using GK-engine, which is a delta-f PIC code solving the nonlinear electrostatic gyrokinetic equations in sheared slab geometry. Initial radial density and temperature profiles exhibiting high logarithmic gradients are used. Radially dependent sources in the form of a Krook operator are introduced to achieve quasi-steady state with sustained heat flux. All simulations are subsequently switched to flux-driven with specified heat sources. Convergence studies and ensemble runs are done against increasing number of markers and under different background temperature adaptation rates. Signal-to-noise diagnostics of initial results have shown an improvement as high as seven times the SNR value, when comparing the adaptive scheme against cases with a stationary background Maxwellian.

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