Full-f gyrokinetic simulation of edge transport in medium-sized tokamaks

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In order to self-consistently simulate edge particle and heat transport both neoclassical and turbulence physics as well as proper boudary conditions and heating operator are required. In the present work, a global 5D full f gyrokinetic particle simulation code ELMFIRE [1] is used to simulate the tokamak plasma edge. The numerical techniques used are valid for steep gradients and distributions which can significantly deviate from Maxwellian. This code has recently shown to reproduce the neoclassical electric field [2] and has been benchmarked to experimental results on plasma rotation and turbulence spectra obtained from the FT–2 tokamak Doppler reflectometry diagnostic [3]. Extending such self-consistent simulation from small to medium size tokamaks is a computational challenge. The importance of a proper heating and cooling model is pointed out in determining time behaviour of transport coefficients and profile evolution.

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References

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