

Zero Dimensional Model for Transport Barrier Oscillations in Tokamak Edge Plasmas

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Transport barriers at the plasma edge are key elements of high confinement regimes in fusion devices. In typical configurations, such barriers are not stable but exhibit quasi-periodic relaxation oscillations. In this work, a zero-dimensional model for such oscillations is presented describing the non linear dynamics of mode amplitudes. The relevant modes are determined by applying a proper orthogonal decomposition[1, 2] to the results from three dimensional turbulence simulations with a transport barrier generated by an imposed shear flow[3]. It is found that the relevant modes depart from linear modes. This leads to a zero dimensional model which reproduces barrier oscillations. Furthermore, an analytic expression for the frequency as a function of shear flow is obtained.

References

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