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ELMs Dynamics Simulations Based on Bifurcation Approach

The ELM phenomenon in fusion plasma is studied based on bifurcation concept. Three transport equations including thermal, particle and momentum in toroidal direction are solved simultaneously, resulting in the prediction of plasma pressure, density, and toroidal momentum profiles as functions of time and radius. The transports include both neoclassical and anomalous effects with the velocity shear dependent suppression effect. The results show plasma pressure, density and toroidal momentum profiles versus time and radius. An edge localized mode, ELM, is included in form of thermal loss once the critical pressure gradient has been reached. Frequency and amplitude of ELMs are investigated. The results exhibit ELMs phenomenon in which a periodically drop of pressure, hence a loss of energy can be observed. It is also found that changing of other model variables affect frequency and type of ELMs.

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