Simulation of transition dynamics to high confinement in fusion plasmas

The transition dynamics from the low (L) to the high (H) confinement mode in magnetically confined plasmas is investigated using a first-principles four-field fluid model. Numerical results are in agreement with measurements from the Experimental Advanced Superconducting Tokamak - EAST. Particularly, the slow transition with an intermediate dithering phase is well reproduced at proper parameters. The model recovers the power threshold for the L-H transition as well as the decrease in power threshold switching from single to double null configuration observed experimentally. The results are highly relevant for developing predictive models of the transition, essential for understanding and optimizing future fusion power reactors.

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