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【606】 Implementation and comparison of rigid and deformable plasma models for tokamak magnetic control design

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The control of plasma position and shape is fundamental to achieve high performance in fusion tokamaks. This work compares different approaches for the simulation of the plasma evolution coupled to controller dynamics: FGE (Forward free-boundary Grad-Shafranov Evolutive code), FGELin (FGE linearised version) and RZIp, all implemented as part of the same tokamak simulation suite MEQ. FGE solves the full Grad-Shafranov equilibrium equation, while RZIp considers only semi-rigid motions of the plasma, considerably reducing the number of states. The basic equations and assumptions are illustrated and a comparison between the performances of the codes is presented. Possibilities towards a real-time estimation of the vertical instability growth rate with RZIp are explored.

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