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Ferromagnetic effect on the rotational stabilization of the resistive wall modes in tokamaks VADIM YANOVSKIY, Consorzio RFX, VLADIMIR PUSTOVITOV, Kurchatov Institute — The plasma stability in tokamaks with a ferromagnetic wall is analyzed because the presence of ferritic materials is expected in the ITER test blanket modules, and experiments with such elements are planned on the JT-60SA tokamak. The study is based on the dispersion relation for ferromagnetic resistive wall modes (RWMs) obtained in the cylindrical approximation by coupling the solution in the external region with arbitrary plasma model assuming only linearity of the plasma response to external perturbations. In contrast to the traditional thin wall approach to RWMs, the wall is treated as magnetically thick. We show that the rotational stabilization of RWMs, which in our model is similar to that observed in DIII-D and other tokamaks [M. S. Chu and M. Okabayashi, Plasma Phys. Control. Fusion **52**, 123001 (2010)] allowing the plasma operation above the no-wall stability limit, becomes stronger in the presence of ferromagnetic wall compared to the case of non-ferritic wall, and is possible even at lower rotation frequency, estimated as several kHz at realistic conditions. Simple analytical formulas describing the effect as well as their applicability ranges are presented.

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