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Edge Plasma Response to Resonant Magnetic Perturbation in Extended MHD Model[1] P. ZHU, University of Wisconsin-Madison — Resonant magnetic perturbation (RMP) can suppress and mitigate edge localized modes in tokamak experiments. To understand the effects of RMP on the properties of tokamak edge pedestal, we study the edge plasma response to RMP using the extended MHD models with anisotropic heat transport as implemented in the NIMROD code. A low-n RMP is imposed as the boundary condition at the tokamak wall location. Plasma responses to RMP are obtained by following the linear and nonlinear evolution of the configuration into steady state subject to the RMP boundary condition. For stable equilibrium, magnetic islands form on resonant surfaces. For marginally and weakly unstable equilibrium, RMP first drives higher-n modes to saturation and the edge region becomes stochastic. As the saturated perturbation decays due to dissipations the RMP-induced islands re-emerge. For unstable equilibrium, the system is driven to a steady state where island structures are buried in the stochastic edge region. A prescribed subsonic toroidal rotation in the pedestal region is found to slightly shrink the sizes of islands induced by RMP. The flow does not affect the formation and inward expansion of the stochastic region resulting from the higher-n modes nonlinearly driven by RMP, in the case of unstable equilibrium.

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