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Neoclassical Toroidal Viscosity Torque Induced by Plasma Response in a Low-β Tokamak with Edge Pedestal[1] XINGTING YAN, University of Science and Technology of China, PING ZHU, University of Science and Technology of China, University of Wisconsin-Madison, YOUWEN SUN, CAS Institute of Plasma Physics — The characteristic profile and magnitude are predicted in theory for the neoclassical toroidal viscosity (NTV) torque induced by the plasma response to the resonant magnetic perturbation (RMP) in a tokamak with an edge pedestal, using the newly developed module coupling the NIMROD and the NTV-TOK codes. For a low β equilibrium, the NTV torque is mainly induced by the dominant toroidal mode of plasma response. The NTV torque profile is radially localized and peaked, which is determined by profiles of both the equilibrium temperature and the plasma response fields. In general, the peak of NTV torque profile is found to trace the pedestal location. The magnitude of NTV torque is extremely sensitive to the β of pedestal top; for a given plasma response, the peak value of NTV torque can increase by three orders of magnitude, when the pedestal β increases by only one order of magnitude. This suggests a more significant role of NTV torque in higher plasma β regimes.

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