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Dependence of RMP penetration threshold on plasma parameters and ion species in helical plasmas

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We investigate the penetration threshold of the RMP (Resonant Magnetic Perturbation) by the external coils in the LHD (Large Helical Device) for the various configurations. In a configuration of the LHD, it has qualitative similar dependence with that in Ohmic tokamak plasmas. However, the qualitative dependence on the collisionality is opposite to that in a high plasma aspect configuration, which is a quite unique property, and first found in the LHD. Also, we investigate the threshold on the ion species, and find that the threshold of deuterium is quite smaller than that of hydrogen. In the above cases, the RMP penetration thresholds are higher as the poloidal rotation is faster, which is qualitatively consistent with the torque balance model between the electro-magnetic and the poloidal neoclassical viscous torque.

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