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Calculation of Magnetic Field Perturbation Using Saddle Coils and Helical Windings Based on IR-T1 Tokamak

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The effect of externally applied resonant helical magnetic fields (RHFs) and a set of saddle coils on plasma column were calculated. The magnetic field of saddle coils compared with magnetic field of the helical winding coil on IR-T1 tokamak in a simulation method. The equation of helical windings that they mounted on vacuum chamber in a spiral modes (L=2, n=1) and (L=3, n=1), where L represents the number of toroidal rounds, and n represents the direction of the poloidal round, using Green function has been calculated. The coordinate system defined on a torus and an electric current applied to create a magnetic field and the magnetic field of resonant helical magnetic field disorders of the confinement were calculated in the whole space. The results shown that the magnetic resonance field in the absence of plasma flow on the direction of the magnetic field confining the plasma column is performed, it was observed that the resultant structure for L=2 is symmetric in 180 degrees but in the L=3 is less symmetric. Also, it was observed that the intensity of perturbed magnetic field in the edge of plasma column for L=3 is higher, so that it could conclude that RHF application may effect mostly on edge magnetohydrodynamics behavior. The shape and structure of the Saddle coils has been defined toroidally and then poloidally configuration. The resulting simulation code is used to predict the position and structure of saddle coil that has same magnetic field generation with respect to helical winding.

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