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Generation of RF-Driven Radial Current and Plasma Rotation in a Tokamak[1] Y.A. OMELCHENKO, V.S. CHAN, Y.R. LIN-LIU, General Atomics, S.C. CHIU, Sunrise R&M, Inc. — Plasma rotation is potentially important for controlling the formation and positioning of internal transport barriers that could stabilize tokamak mictoturbulence and improve plasma confinement. This work focuses on identifying possible physical mechanisms capable of inducing plasma rotation and rotational shear via the ion cyclotron resonance frequency (ICRF) heating of minority ion species in a tokamak. Ion dynamics are calculated with a Monte-Carlo code in which wave-induced energy diffusion is accounted for by a quasilinear operator. The code follows particle drift trajectories in a tokamak geometry under the influence of RF fields and collisions with the background plasma. The effect of finite-size banana trajectories on resonance plasma heating and radial current generation are investigated and a conceptual model for the RF-induced toroidal plasma rotation is proposed. The results have been scaled with respect to the absorbed RF power and resonance position and are shown to be consistent with the magnitude of the toroidal rotation observed experimentally. Further development of the present RF model is discussed.

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