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Effects of Electron Cyclotron Heating on the Toroidal Flow in HSX Plasmas YASUHIRO YAMAMOTO, SADAYOSHI MURAKAMI, Kyoto University, SANTHOSH KUMAR, JOSEPH TALMADGE, KONSTANTIN LIKIN, DAVID ANDERSON, University of Wisconsin-Madison — Spontaneous toroidal flows have been observed in electron cyclotron heating (ECH) plasmas in HSX. HSX has two typical magnetic configurations: The Quasi-Helically Symmetric (QHS) configuration and the Mirror configuration, where a set of auxiliary coils breaks the helical symmetry. The QHS configuration has a neoclassical viscosity that is smaller than that of the Mirror configuration, so we expected that the toroidal flow velocity in the QHS configuration would be larger than that of the Mirror configuration. However smaller toroidal flow was observed in the QHS configuration. It has not been understood well yet. In previous studies, we have found that ECH can drive the $j_r \times B$ and collisional force, and the $j_r \times B$ force overcomes the collisional force. In this study, we evaluate the forces by ECH, and compare them to the experimental results. To evaluate these forces, we apply the GNET code, which can solve a linearized drift kinetic equation for supra-thermal electrons by ECH in 5-D phase space. Solving the momentum balance equations and Ampère's law, we evaluate the toroidal flow velocity. Experimentally we will measure the plasma flow velocity in HSX as a function of plasma parameters (density and temperature), and compare them with simulations.

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