Abstract Submitted
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Plasma Density Effects on Toroidal Flow Stabilization of Edge Localized Modes[1] SHIKUI CHENG, University of Science and Technology of China, PING ZHU, University of Science and Technology of China, University of Wisconsin-Madison, DEBABRATA BANERJEE, University of Science and Technology of China — Recent EAST experiments have demonstrated mitigation and suppression of edge localized modes (ELMs) with toroidal rotation flow in higher collisionality regime, suggesting potential roles of plasma density. In this work, the effects of plasma density on the toroidal flow stabilization of the high-n edge localized modes have been extensively studied in linear calculations for a circular-shaped limiter H-mode tokamak, using the initial-value extended MHD code NIMROD. In the single MHD model, toroidal flow has a weak stabilizing effects on the high-n modes. Such a stabilization, however, can be significantly enhanced with the increase in plasma density. Furthermore, our calculations show that the enhanced stabilization of high-n modes from toroidal flow with higher edge plasma density persists in the 2-fluid MHD model. These findings may explain the ELM mitigation and suppression by toroidal rotation in higher collisionality regime due to the enhancement of plasma density obtained in EAST experiment.

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