Abstract Submitted
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Detailed study of spontaneous rotation generation in diverted H-mode plasma using the full-f gyrokinetic code XGC1 JANGHOON SEO, KAIST, C.S. CHANG, S. KU, PPPL, J.M. KWON, NFRI, E.S. YOON, KAIST — The Full-f gyrokinetic code XGC1[1] is used to study the details of toroidal momentum generation in H-mode plasma.[2] Diverted DIII-D geometry is used, with Monte Carlo neutral particles that are recycled at the limiter wall. Nonlinear Coulomb collisions conserve particle, momentum, and energy. Gyrokinetic ions and adiabatic electrons are used in the present simulation to include the effects from ion gyrokinetic turbulence and neoclassical physics, under self-consistent radial electric field generation. Ion orbit loss physics is automatically included. Simulations show a strong co-I_p flow in the H-mode layer at outside midplane, similarly to the experimental observation from DIII-D[3] and ASDEX-U[4]. The co-I_p flow in the edge propagates inward into core. It is found that the strong co-I_p flow generation is mostly from neoclassical physics. On the other hand, the inward momentum transport is from turbulence physics, consistently with the theory of residual stress from symmetry breaking.[5,6] Therefore, interaction between the neoclassical and turbulence physics is a key factor in the spontaneous momentum generation.

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