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Clarification of symmetry breaking mechanism in intrinsic rotation of tokamak plasmas S. YI, J.M. KWON, NFRI, Korea, T. RHEE, NFRI and POSTECH, Korea, P.H. DIAMOND, CMTFO and CASS, UCSD, USA and WCI Center, NFRI, Korea, J.Y. KIM, NFRI, Korea — Intrinsic rotation of tokamak plasmas is considered to be generated by non-diffusive stress (i.e. residual stress) induced by asymmetric $k_{||}$ turbulence spectrum. To study the symmetry breaking mechanisms in intrinsic rotation, we have performed numerical simulations of intrinsic rotation by ITG turbulence using the gKPSP code, a delta-f global PIC code for tokamak. It is found that not only distortion of turbulence spectrum by $E \times B$ shear but also spatial diffusion of wave momentum driven by turbulence intensity gradient play an important role in the symmetry breaking mechanism, as expected from a theory [1]. It is hard to recognize individual contribution of $E \times B$ shear and turbulence intensity gradient to the residual stress because their evolution is strongly coupled with the prey-predator feature [2]. To clarify their role, a comprehensive analysis including their nonlinear coupling is performed. The key symmetry breaking mechanism is identified for various physics situations.

[1] P.H. Diamond, et al., Phys. of Plasmas 15, 012303 (2008).
[2] P.H. Diamond, et al., PRL 72, 2565 (1994).

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