

Summary of TH/P6-24 : Analysis of Radial Electric Field Formation by Asymmetry of Neutral Beam Injection on KSTAR and NSTX based on the Gyro-Center Shift

- The theory of Gyrocenter Shift(GCS) is extended to the tokamak core region to explain the radial electric field formation by NBI momentum input.
- GCS theory explained E_r formation at tokamak edge, H-mode transition mechanism, and turbulence induced diffusion (anomalous transport) and now the momentum transport mechanism is investigated by the same principle of ion-neutral interaction.
- The origin of poloidal rotation in tokamak is analyzed by the unbalanced $E \times B$ where the E-field is induced by the momentum exchange of NBI neutrals with plasma ions.
- This analysis is compared with experimental results from KSTAR and NSTX
- Two poloidal rotation diagnostics of Microwave Imaging Reflectometer (MIR) and Beam Emission Spectroscopy (BES) in KSTAR are used to measure the difference for NBI source scan to verify the GCS analysis and a neoclassical code result is also compared.
- GCS analysis for NSTX poloidal rotation is compared with Charge Exchange Recombination Spectroscopy (CHERS) measurement.
- Poloidal rotations for NBI source scan on KSTAR showed qualitative agreement with GCS theory.
- Poloidal rotations for toroidal B-field scan on NSTX showed that the GCS analysis is closer to the measurements than the neoclassical analysis.
- Further study of poloidal rotation experiment will be available when NBIs of two devices are upgraded.