Contribution ID: **94** Type: **Poster**

Fast ion driven electron drift instability in reversed shear plasmas

Wednesday, 4 September 2019 15:15 (15 minutes)

It is shown that trapped fast ions can destabilize the electron drift wave because fast ions reverse their precession direction in RS plasmas to electron diamagnetic direction and can resonate with electron drift wave.[1] A local stability analysis of this new instability is performed and consequent quasi-linear transport is calculated using gyrokinetic equations in toroidal geometry [2,3] under fusion reactor condition. The new instability occurs when the temperature gradient of fast ions peaks sufficiently compared to the density profile and the linear growth rate is linearly proportional to the temperature gradient length of fast ions which is the free energy source of the instability. Strongly negative shear plasmas are more favorable for the new instability. The resulting quasi-linear particle flux of fast ions is outward while the particle flux of main hydrogenic ions is inward. These results show that the new instability might be beneficial for burning plasma operation because it can expel lower energy He ions preferentially while keeping the ion working gas inside.
[1] B. J. Kang and T. S. Hahm, Phy. Plasmas 26, 042501 (2019).
[2] E. A. Frieman and L. Chen, Phys. Fluids 25, 502 (1982).
[3] T. S. Hahm, Phys. Fluids 31, 2670 (1988).

Country or International Organization

Korea, Republic of

Primary authors: Mr KANG, ByungJun (Seoul National University); HAHM, Taik Soo (Seoul National University)

Presenter: Mr KANG, ByungJun (Seoul National University)

Session Classification: Poster

Track Classification: Multiscale Physics and Instabilities in Burning Plasmas