Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Gyrokinetic Simulation Study for Global Structures of Flows in KSTAR JAE-MIN KWON, National Fusion Research Institute — To predict the performance of fusion machine such as tokamak, it is critical to understand the physics of plasma turbulence and flow. In this presentation, we report recent progresses in theoretical and experimental studies of plasma flows in KSTAR tokamak. Firstly, we present gyrokinetic simulation studies for the effects of external magnetic fields on plasma flow in a KSTAR L-mode discharge. It is shown that a (2,1) magnetic field induced by the external fields changes the structures of poloidal plasma flows and these changes affect the ambient plasma fluctuations and resulting transports. Along with these simulations, we also present 2D ECEI measured electron temperature fluctuations in the corresponding KSTAR L-mode discharge, which reveals the structures of plasma flows around the (2,1) magnetic island. It is found that the flow structures from the gyrokinetic simulations are consistent with the experimental ones. Secondly, we report 2D ECEI measurement of electron temperature fluctuations in a MHD-free KSTAR L-mode plasma, which reveals quasi-static corrugations in the electron temperature profile and also hints the existence of zonal flow shearing layers corresponding to the corrugations. Very interestingly, it is found that global gyrokinetic simulations employing the experimental condition also show similar corrugation patterns and zonal flow shearing layers. More detailed results and implications of them will be discussed in the presentation.

Jae-Min Kwon
National Fusion Research Institute

Date submitted: 02 Jul 2019

Electronic form version 1.4