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Anomalous electron transport induced by multiple beam ion driven global Alfven instabilities[1] NIKOLAI GORELENKOV, PPPL, Princeton University, ALLEN BOOZER, Columbia University, DAN STUTMAN, Johns Hopkins University, ERIC FREDRICKSON, PPPL, Princeton University, KEVIN TRITZ, Johns Hopkins University, ROSCOE WHITE, PPPL, Princeton University
— We investigate theoretically the electron thermal transport induced by multiple Global Alfvén Eigenmodes (GAE) in a toroidal plasma recently reported in NSTX when strong $P_{NBI} = 6MW$ NBI heating was applied. A strong GAE activity correlates with such transport. The stochastization of electron longitudinal motion in the presence of the multiple oscillations is responsible for the electron transport. Application of the guiding center code, ORBIT, shows that the required level of the electron heat conductivity, $\chi_e \geq 10m^2/sec$ can be achieved in simulations with ~ 20 intermittently unstable GAEs with the local density perturbation amplitudes on the order of $\delta n_e/n_e = 10^{-3}$. Our simulations address the requirements for GAE structure, amplitudes and the number of modes to achieve the electron heat diffusivity inferred from experiments. Results from the comparisons of the theory and recent NSTX experiments will be presented. The above anomalous electron transport potentially can have significant implications for fusion devices.

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