Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Increase in turbulent transport at DIII-D pedestal top due to RMP-induced reduction of electric field shear SAM TAIMOURZADEH, LEI SHI, Univ of California - Irvine, IHOR HOLOD, LLNL, ZHIHONG LIN, Univ of California - Irvine, RAFFI NAZIKIAN, Princeton Plasma Physics Lab., DONALD SPONG, ANDREAS WINGEN, Oak Ridge Nt'l Lab. — It has been demonstrated that resonant magnetic perturbations (RMPs), applied with the right conditions, suppress or mitigate edge localized modes (ELMs) in DIII-D at low, ITER-like, collisionality. Along with the RMP ELM suppression, observations in DIII-D, via BES, DBS, and other fluctuation diagnostics, show an increase in electrostatic turbulence near the top of the pedestal, where the mean radial electric field (Er) shearing rate decreases. The Gyrokinetic Toroidal Code (GTC) simulations show that there is a strong correlation between the reduction of the Er shearing rate and an increase in turbulence and transport near the pedestal top of the DIII-D shot 158103 during RMP ELM suppression at 03050 ms. A nonlinear outward spreading of the turbulence is observed, which allows a stronger microturbulence on the pedestal top during ELM suppression by RMP. For comparison, the turbulence and transport near the pedestal top remain at low levels when the plasma is ELMing, i.e. when the Er shearing rate is not decreased in the same shot at 03750 ms (ELMing w/ RMP on) and in another shot 158104 at 1350 ms (ELMing without RMP). Furthermore, GTC simulations show that the kink responses to the 3D RMP has little effects on the growth rate of electromagnetic kinetic-ballooning mode and on the turbulent transport and zonal flow damping in electrostatic turbulence[1].

Sam Taimourzadeh
Univ of California - Irvine

Date submitted: 25 Jul 2017 Electronic form version 1.4