Abstract Submitted
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Modeling of the effect of TAEs and TAE avalanches on neutral beam ion orbits in NSTX[1] L. SHI, PPPL, N. CROCKER, UCLA, D. DARROW, E. FREDRICKSON, N. GORELENKOV, M. PODESTA, R. WHITE, PPPL — Fast ion loss caused by MHD modes is an important issue for magnetically confined plasmas. Using the guiding center approximation, in the unperturbed axisymmetric magnetic field, particle's energy E, magnetic moment μ, and toroidal canonical momentum P_ζ are conserved. In principle, the existence of magnetic perturbations will break the conservation of these quantities. However, the Toroidal Alfven Eigenmodes (TAEs) typical frequencies are much lower than the ion gyro- frequency. Thus, the magnetic moment μ is still conserved. In this case, the redistribution of particles within the $P_\zeta - E$ plane is the key for understanding particle transport due to TAEs. We use an EFIT equilibrium, with TAE mode structures computed by NOVA, as input to the guiding center code ORBIT to calculate the particle orbits evolution and thus the mode induced redistribution in $P_\zeta - E$ plane. Results with different mode structures and amplitudes are shown in this presentation. In addition, using the initial beam ion distribution given by TRANSP code, we show that this method can predict the ion loss in the observed energy and pitch angles.

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