

Abstract Submitted
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Fast Ion Transport by Coupled Tearing and Kink Modes in NSTX¹ JEONG-HUN YANG, MARIO PODESTA, ERIC FREDRICKSON, Princeton Plasma Physics Laboratory — Fast ion transport by coupled tearing and kink modes is observed in NSTX. The relative phase of tearing and kink modes affects the fast ion pressure up to 10% and NB-driven current density by up to 20% in the low aspect ratio plasma. The fast ion interactions with either tearing or kink modes have been reported, but the interaction with coupled tearing and kink modes is reported for the first time. The analysis uses the “Kick” model in TRANSP, where fast ion dynamics in perturbed magnetic field are computed using the particle-following code ORBIT, with input provided by analytic eigenfunctions of tearing and kink modes scaled based on SXR data. With experimental inputs only, the modeled neutron rate agrees with the measured neutron rate, whereas with classical runs the neutron rate is overestimated by 20%. It is found that the relative phase of tearing and kink modes affects the fast ion transport and the mode combination affects the energy transfer between modes and fast ions. The synergetic effects of the tearing and kink modes in fast ion transport suggest that fast ion distributions may contribute to the mode coupling as well.

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