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Phase-Space Dependence of Fast-Ion Transport by Neoclassical Tearing Modes[1] W HEIDBRINK, D.J. LIN, Y.B. ZHU, UCI, L. BARDOCZI, ORISE, C.S. COLLINS, C. MUSCATELLO, M. VAN ZEELAND, GA, G. KRAMER, M. PODESTA, PPPL — The fast-ion transport caused by neoclassical tearing modes (NTM) in H-mode plasmas is investigated in different parts of fast-ion phase space using the newly developed beam modulation technique and a variety of fast-ion diagnostics that are sensitive to different parts of the distribution function. As measured by electron cyclotron emission, the $(m, n) = (2, 1)$ tearing modes have an island width of ~ 10 cm and change phase 180° at the $q = 2$ surface. (Here, m is the poloidal mode number and n is the toroidal mode number.) The fast ions are produced by deuterium neutral beam injection at 75-81 keV. To measure fast-ion transport in different parts of phase space, one neutral-beam source is modulated at 20 Hz. Flows in phase space are obtained through comparisons of measured neutron, solid-state neutral particle analyzer, and fast-ion D-alpha signals with the expected signals in the absence of wave-induced transport. In order to populate different parts of phase space, beams with six different injection geometries are modulated on successive discharges. Initial analysis indicates that the largest transport occurs for on-axis, tangentially-injected ions, while smaller transport occurs for off-axis or perpendicular injection. Simulations show similar trends.

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