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DIII-D Experiments on Cyclotron Harmonic Absorption of Fast Waves¹ R.I. PINSKER, C.C. PETTY, R. PRATER, M. CHOI, GA, W.W. HEIDBRINK, Y. LUO, UCI, F.W. BAITY, M. MURAKAMI, ORNL, M. PORKOLAB, MIT — In the presence of a sufficiently dense population of fast ions from either neutral beam heating or from fusion products in a burning plasma, ion cyclotron damping of fast waves (FW) is important even at moderate to high ion cyclotron harmonics. DIII-D experiments have coupled up to 3 MW of FW power at 60 MHz and at 116 MHz to investigate damping on fast ions at harmonics from the 2nd harmonic of hydrogen to the 8th harmonic of deuterium. In agreement with linear theory, strong absorption was observed on fast ions from an injected 81 keV deuterium beam at the 4th and 5th harmonics for 60 MHz FW. Comparison of 4th and 8th deuterium harmonic absorption at a fixed magnetic field have shown that the latter is weak at low density, also as expected. However, at high density the 8th harmonic absorption continued to be much weaker than at the 4th, in apparent contradiction to predictions of strong absorption at both harmonics under those conditions. Possible explanations of the discrepancy are discussed.

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