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Absorption of Fast Waves at Moderate to High Ion Cyclotron Harmonics: Experimental Results and Theoretical Models,* R.I. Pinsky, M. Choi, R. Prater, *GA*, W.W. Heidbrink, Y. Luo, *UCI*, F.W. Baity, M. Murakami, *ORNL*, M. Porkolab, *MIT*, and the RF SciDAC Group – Strong absorption of fast Alfvén waves (FW) by ion cyclotron damping has been observed in DIII-D at the 4th and 5th harmonic of an injected beam while only weak absorption is observed at the 8th harmonic. The experimental results are compared with three different theoretical models; differences between the predictions of the models suggest the possible importance of finite-width orbit effects at high harmonics. In a linear model, it is found that damping on fast ions from neutral beam injection can be significant even at the 8th harmonic under experimentally relevant conditions. This is tested in experiments in DIII-D with FW power at 60 MHz and at 116 MHz. A novel D_{α} charge exchange recombination diagnostic is used to observe interaction of the FW power with beam ions. The results are compared with modeling with quasilinear and with orbit-following codes.

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