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Measurement of ion energies in a magnetized RF sheath[1] JB.O. CAUGHMAN, T.S. BIGELOW, D.L. GREEN, E.H. MARTIN, Oak Ridge National Laboratory, J.R. MYRA, Loadstar Research Corp — The interaction between an ion cyclotron resonant heating (ICRH) antenna and the near-field plasma can lead to rectified high-voltage sheath formation and subsequent material erosion on surfaces that are magnetically connected to the antenna. This issue is being studied in a magnetized plasma by measuring the ion energy distribution function (IEDF) on magnetic field lines that are connected to or pass near an RF-driven electrode that is inserted into an electron cyclotron resonant (ECR) plasma source. The 13.56MHz RF-driven electrode is DC grounded to simulate the RF potential that exists on the ICRH antenna surfaces. Microwaves at 2.45 GHz are used to produce hydrogen and helium ECR plasmas at densities of ~$10^{18}/m^3$, with T_e of 3-5 eV, in magnetic fields of ~0.1 T. A retarding-field energy analyzer is radially scanned to measure the spatial variation of IEDF profiles. Results show that the IEDF, measured 0.35 m from the electrode, becomes broader and extends to higher energies as the RF voltage increases. These results are compared to theoretical predictions of a magnetized RF sheath. Scaling as a function of RF-driven voltage and implications for material erosion on surfaces magnetically connected to an antenna will be presented.

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