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Measuring the ion energy distribution using a retarding field energy analyzer in a plasma material interaction test stand MICHAEL CHRISTENSON, SOONWOOK JUNG, DANIEL ANDRUCZYK[1], DAVIDE CURRELI, DAVID RUZIC, CPMIU, Department of Nuclear, Plasma and Radiological Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801 USA — The Divertor Erosion and Vapor Shielding eXperiment (DEVeX) at the University of Illinois is a gas-puff driven, theta pinch plasma source that is used as a test stand for off-normal plasma events incident on materials in the edge and divertor regions of a tokamak. Ion temperatures and the resulting energy distribution are of vital importance in DEVeX, indicating the level of edge simulation. For this reason, a theta pinch has been applied as a source of external heating, along with a coaxial plasma accelerator as a pre-ionization source. In its most recent iteration, the accurate diagnosis of ion temperature will prove difficult using conventional methods, since diagnostics are difficult in a pulsed device for measuring the ion temperature range produced in DEVeX ($\sim$10-100 eV). A retarding field energy analyzer (RFEA) has been proposed to measure the ion energy distribution and will be compared to theoretical predictions for the ion temperature in the upgraded DEVeX system. Such a diagnostic tool would be less susceptible to external fields and would be suitable for ion temperatures on the order of 100 eV. The RFEA will serve as a diagnostic for the ThermoElectric-driven Liquid-metal plasma-facing Structures (TELS), and its further applications are discussed.

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