The Effects of Neutral Damping on Resistive Wall Mode Physics

R. JAMES, Coast Guard Academy/Stevens Institute of Technology, K. BECKER, Stevens Institute of Technology, J. HANSON, A. KLEIN, M.E. MAUEL, D.A. MAUERER, G.A. NAVRATIL, T.S. PEDERSEN, N. STILLITS, Columbia University — The physics of the dissipation mechanism responsible for rotational stabilization of the resistive wall mode (RWM) is an object of intense current research. On the HBT-EP tokamak there is experimental evidence that edge neutral damping is a significant dissipation mechanism that affects tearing mode behavior [1]. We describe initial progress made towards investigating neutral particle damping effects on RWM dynamics in HBT-EP plasmas. We will report on initial calculations using http://psfwww2.psfc.mit.edu/people/labombard/LaBombard’s (MIT) 1D space, 2D velocity kinetic transport model for atomic and molecular deuterium penetration to quantify profiles of these neutrals within the plasma [2]. In addition, the design, construction, and implementation of a 16-channel linear photo-detector array will be described, and its use to measure $D_\alpha$ emission, plasma fluctuations, and neutral penetration profiles. Initial estimates of the RWM dissipation parameter based on these modeling and measurement efforts will be discussed.

2 B. LaBombard, MIT PSFC RR-00-9, (2000).

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