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The Effects of Neutral Damping on Resistive Wall Mode Physics[1]

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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://psfcwww2.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_α emission, plasma fluctuations, and neutral penetration profiles. Initial estimates of the RWM dissipation parameter based on these modeling and measurement efforts will be discussed.

1 E. D. Taylor, *et al.,* Phys. Plasmas **9**, 3938 (2002)
2 B. LaBombard,MIT PSFC RR-00-9, (2000).

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