The Effects of Neutral Damping on Resistive Wall Mode Physics\textsuperscript{1}

R. JAMES, US Coast Guard Academy/Stevens Institute of Tech., K. BECKER, Stevens Institute of Tech., J.M. HANSON, M.E. MAUEL, D.A. MAURER, G.A. NAVRATIL, T.S. PEDERSEN, Columbia University — The physics of the dissipation mechanism responsible for rotational stabilization of the resistive wall mode (RWM) continues to be an object of intense current research. On the High Beta Tokamak – Extended Pulse (HBT-EP), there is experimental evidence that edge neutral damping is a significant dissipation mechanism that affects tearing mode behavior \cite{1}. To quantify the possible effect of neutral damping on RWM physics, we have constructed a 15-channel linear photo-detector array to measure D\textalpha emission and its fluctuations. These measurements will be used in conjunction with a 1D space and 2D velocity kinetic transport model of the atomic and molecular deuterium penetration to quantify neutral profiles within the plasma \cite{2}. Initial quantification of the neutral damping contribution to RWM rotational stabilization utilizing the measured D\textalpha profiles to estimate the edge neutral density will be presented.

\textsuperscript{1}Supported by U.S. DOE Grant DE-FG02-86ER53222.

\cite{1} E. D. Taylor, \textit{et al.}, Phys. Plasmas 9, 3938 (2002)
\cite{2} B. LaBombar, MIT PSFC RR-00-9, (2000).