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Plans for the Study and Control of the Ferritic Resistive Wall Mode on HBT-EP D.A. MAURER, P.J. BYRNE, B. DEBONO, J.P. LEVESQUE, B. LI, M.E. MAUEL, G.A. NAVRATIL, T.S. PEDERSEN, N. RATH, D. SHIRAKI, Columbia University — A leading candidate for low activation, high neutron radiation resistant damage materials required in a DT fusion power plant is a broad class of ferritic steel alloys. Unlike low magnetic permeability stainless steel alloys routinely employed in present day toroidal fusion energy experiments, these candidate ferritic steel alloys have significant ferromagnetic properties even though the strong toroidal magnetic fields in a fusion power plant would drive the ferritic steel structural material into magnetic saturation. In addition to the introduction of 3D magnetic field errors onto the plasma equilibrium, the residual ferromagnetism attracts magnetic flux perturbations associated with long wavelength MHD modes and provides an additional ferritic destabilization of the beta driven resistive wall kink mode – the FRWM. These ferritic wall destabilization effects have not yet been observed experimentally in toroidal confinement geometry, but were observed recently in a linear line-tied pinch device [Bergerson 2008]. Implementation scenarios, their design, and the installation of ferritic wall elements needed to illustrate the key physical effects of the FRWM on the HBT-EP experiment will be presented and discussed. Supported by U.S. DOE Grant DE-FG-02-86ER53222.

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