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Control of magnetohydrodynamic modes in RFPs with a resistive wall above the wall stabilization limit JOHN FINN, GIAN LUCA DELZANNO, LANL — Studies are shown of control of magnetohydrodynamic (MHD) modes in a cylindrical model for an RFP, in the presence of a resistive wall, below and above the regime for which stabilization is possible with a perfectly conducting wall, i.e. below and above the ideal wall limit. The results show that resistive plasma (tearing-like) modes can be feedback stabilized for current profiles which are unstable below and above the ideal wall limit, for reversed field pinch RFP-like profiles (q(r) decreasing) in a simple model with step function current and pressure profiles. Similar results were found for tokamak-like (q(r) increasing) profiles. However, above the limit for wall stabilization of ideal plasma modes, resonant or non-resonant, the feedback scheme cannot provide stabilization. The control scheme senses both normal and tangential components of the perturbed magnetic field, and the feedback is proportional to a linear combination of the two. More recent results with realistic RFP profiles also show that ideal and resistive (tearing) modes can both be stabilized below their wall stabilization limits. Tearing modes, but not ideal plasma modes, can be stabilized above their wall limits. A physical interpretation of these results is presented. We will also present new results including plasma rotation or complex gain.

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