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**Modification of the Magnetized Shercliff Layer Instability in the Princeton MRI Experiment by Conducting Endcaps** KYLE CASPARY, DAHAN CHOI, ERIK GILSON, Princeton Plasma Physics Laboratory, JEREMY GOODMAN, Princeton University, HANTAO JI, Princeton Plasma Physics Laboratory, Princeton University, PETER SLOBODA, Princeton Plasma Physics Laboratory — The Princeton MRI experiment is a modified Taylor-Couette device that uses a GaInSn eutectic working fluid to study rotating MHD flows. Results are presented from an experimental and numerical study investigating the effect of conducting axial boundary conditions, as opposed to insulating boundaries, on a free-Shercliff-layer instability. The free Shercliff layer is formed when a sufficiently strong magnetic field is imposed across a rotating, conducting fluid that is bounded axially by end caps with a pair of differentially rotating rings. With insulating end caps, the instability threshold corresponds to when the Elsasser number equals unity and the instability is characterized by a transition from flows with azimuthal structure with mode number m ¿ 1 to flows with a dominant m = 1 mode. A reduced stability threshold is observed for a variety of sheared flows with the introduction of conducting end caps. In this case, the stability threshold is well-described by an Elsasser number of unity but using the conductivity and density of copper and the instability is characterized by fluctuations in multiple m ¿ 1 modes. Measurements of the fluid velocity field are compared with results from the Spectral Finite Element Maxwell and Navier Stokes (SFEMaNS) code.

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