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Active feedback stabilization of the flute instability in a mirror machine using field-aligned coils ASSAF LIFSHITZ, ILAN BE'ERY, Physics Department, Technion, Haifa 32000, Israel, AMNON FRUCHTMAN, Faculty of Sciences, H.I.T. - Holon Institute of Technology, Holon 58102, Israel, AMNON FISHER, AMIRAM RON, Physics Department, Technion, Haifa 32000, Israel — Plasma confined in mirror machine is unstable even at low β, mainly because of the flute instability. One possible way to stabilize the plasma is to use active feedback to correct the plasma shape in real-time. The investigated apparatus consists of feedback coils aligned with the magnetic field, immersed in cold plasma around the hot core. When the current through the feedback coils changes, the plasma moves to conserve magnetic flux via compressional Alfven waves. An analytical model is used to find a robust feedback algorithm with zero residual currents. It is shown that due to the plasma's rotation, maximal stability is obtained with large phase angle between the perturbations' modes and the feedback integral-like term. Lastly, a 2-dimentional MHD simulation implementing the above algorithm indeed shows stabilization of the plasma with zero residual currents.

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