

Bifurcation-driven vertical plasma displacement

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Summary

- In the ideal wall limit, the plasma with a subcritical current must move vertically to remain force-free. We attribute this motion to the asymmetry of the magnetic field created by the external shaping conductors.
- The plasma remains stable en route to the first wall, and the time scale of this motion is roughly the plasma current decay time. This adiabatic adjustment of the equilibrium position is conceptually different from the instability driven picture.
- The initial steady-state equilibrium remains stable if the decaying plasma current is higher than the threshold value. The critical current that triggers the bifurcation is determined by the external conductors or the shape of the wall. It is desirable to optimize the critical current to minimize mechanical and thermal loads on the wall.