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Influence of initial magnetic field configuration on spheromak evolution GIOVANNI CONE, CARL SOVINEC, University of Wisconsin-Madison — The influence of the initial magnetic field distribution on spheromak formation and closed flux generation upon decay is studied using the NIMROD code. Previous spheromak simulations using the NIMROD code have demonstrated the formation of axisymmetric closed flux surfaces with decay of the magnetic field. The q profile within the closed flux region was non-monotonic with values $q_0 \sim 0.8$ and $q_{\min} \sim 0.5$. As the configuration evolved, a $m = 1$, $n = 2$ mode led to localized magnetic field chaos resulting in a degradation of thermal energy confinement. Given the limited ability to control the evolution of the q profile within the closed flux region of a spheromak, we investigate the possibility of forming spheromak plasmas that avoid this deleterious mode by tailoring the initial magnetic field profile appropriately. Poloidal flux amplification during the formation process involves conversion of injected toroidal flux via a line-tied kink mode. By strengthening or weakening the initial magnetic field along the geometric axis of the flux conserver, we attempt to control the amount of flux amplification to produce higher or lower values of q throughout the closed flux surface region. Simulations are performed using a finite element grid that approximates the geometry of the Sustained Spheromak Physics Experiment. In collaboration with Bick Hooper and Bruce Cohen, Lawrence Livermore National Laboratories.

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