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Projected scaling of sustained spheromak configurations for economical fusion power[1] D.A. SUTHERLAND, T.R. JARBOE, CTFusion, Inc. — Sustained spheromaks are of historical and recent interest for fusion energy applications due to their compactness, engineering simplicity, and projected economic competitiveness with incumbent sources of electrical power generation. Fundamentally, spheromaks are compact plasma configurations with both toroidal and poloidal plasma currents responsible for generating confining poloidal and stabilizing toroidal magnetic fields, respectively. However, due to large field-normalized plasma currents relative to tokamak configurations, some method of energy efficient current drive must be employed to allow for reasonable recirculating power fractions in an eventual spheromak fusion reactor system. A novel method of spheromak plasma current sustainment called Imposed-Dynamo Current Drive (IDCD) originally pioneered by the HIT-SI Research Group at the University of Washington is presented with projected favorable scaling towards high temperature (T >1 keV) sustained spheromak plasma conditions. In particular, it is argued that this method of helicity injection current drive will allow for the production of high current gain sustained spheromak configurations with sufficient energy confinement quality required for an eventual spheromak fusion reactor system.

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