

Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Imposed-Dynamo Current Drive (IDCD) THOMAS JARBOE, BRIAN VICTOR, BRIAN NELSON, CHRIS HANSEN, CIHAN AKCAY, DAVID ENNIS, AARON HOSSACK, GEORGE MARKLIN, ROGER SMITH, University of Washington — A mechanism for Steady Inductive Helicity Injection (SIHI) current drive has been discovered where the current driving fluctuations are not generated by the plasma but rather are imposed by the injectors.[T.R. Jarboe *et al.*, accepted for publication in *Nuclear Fusion*] Sheared flow of the electron fluid distorts the imposed fluctuations to drive current. The model accurately predicts the time dependent toroidal current, the injector impedance scaling, and the profile produced in the HIT-SI experiment. These results show that a stable equilibrium can be efficiently sustained with imposed fluctuations and the current profile can, in principle, be controlled. Both are large steps for controlled fusion. Some of the effects of the fluctuations on the confinement of tokamak and spheromak reactors are assessed and the degradation may be tolerable since the required fluctuations, in a reactor, are low ($\Delta B/B$ about 0.0001). A larger experiment (HIT-PoP) designed to test the confinement properties of a plasma sustained by IDCD is discussed. Since these very low fluctuation levels can provide current drive for the entire plasma the effect of random fluctuations on the plasma current profile is extremely important. The mechanism is also of interest to plasma self-organization, fast reconnection and plasma physics in general.

Thomas Jarboe
University of Washington

Date submitted: 13 Jul 2012

Electronic form version 1.4