Modeling of stochastic magnetic flux loss from the edge of a poloidally diverted tokamak

T.E. Evans, R.A. Moyer[a)] and P. Monat[a)]
General Atomics, P.O. Box 85608 San Diego CA 92186-5688

A field line integration code is used to study the loss of edge poloidal magnetic flux due to stochastic magnetic fields produced by an error field correction coil (C–coil) in DIII–D [J.L. Luxon, Nucl. Fusion **42,** 614 (2002)] for various plasma shapes, coil currents and edge magnetic shear profiles. We find that the boundary of a diverted tokamak is more sensitive to stochastic flux loss than a nondiverted tokamak. The C–coil has been used to produce a stochastic layer in an ohmic diverted discharge with characteristics similar to those seen in stochastic boundary experiments in circular limiter ohmic plasmas, including: (1) an overall increase in recycling, (2) a broadening of the recycling profile at the divertor, and (3) a flattening of the boundary profiles over the extent of the stochastic layer predicted by the field line integration code. Profile flattening consistent with field line integration results is also seen in some high performance discharges with edge transport barriers. The prediction of a significant edge stochastic layer even in discharges with high performance and edge radial transport barriers indicates that either the self-consistent plasma response heals the stochastic layer or that edge stochastic layers are compatible with edge radial transport barriers.

[a)]Center for Energy Research, University of California, San Diego, La Jolla CA 92093-0417.