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Calculation of stochastic broadening in real space due to noise and field errors in the DIII-D tokamak LISA BRODSKY, ALKESH PUNJABI, HALIMA ALI, Hampton University — The equilibrium EFIT data for the DIII-D shot 115467 at 3000 ms is used to construct the equilibrium generating function for magnetic field line trajectories in the DIII-D tokamak in natural canonical coordinates. A canonical transformation is used to construct an area-preserving map for field line trajectories in the natural canonical coordinates in the DIII-D. Maps in natural canonical coordinates have the advantage that natural canonical coordinates can be inverted to calculate real space coordinates (R,Z,ϕ) , and there is no problem in crossing the separatrix. This is not possible for magnetic coordinates. This map is applied to calculate stochastic broadening due to magnetic noise and field errors in the DIII-D. Mode numbers for noise + field errors are $(m,n)=\{(3,1), (4,1), (6,2), (7,2), (8,2), (9,3), (10,3), (11,3), (12,3)\}$. The common amplitude δ is varied from 0.8×10^{-5} to 2.0×10^{-5} . Preliminary results suggest that the width of stochastic layer from noise and field errors in the DIII-D varies from about 7 to 16 cm near X-point, and about 0.6 to 3% of poloidal flux is lost from inside ideal separatrix. This work is supported by US Department of Energy grants DE-FG02-07ER54937, DE-FG02-01ER54624 and DE-FG02-04ER54793.

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