Abstract Submitted
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3D Structure and Dynamics of ELMs[1] T.E. EVANS, GA, J.G. WATKINS, SNL, I. JOSEPH, J.H. YU, UCSD, M. JAKUBOWSKI, MPI, O. SCHMITZ, FZ-Juelich — Understanding the global topology and dynamics of edge localized modes (ELMs) is essential for predicting transient loading on plasma facing surfaces. Fast visible line emission images taken during ELMs consistently show filament-like helical structures that expand radially outward from the pedestal while rotating toroidally. Fast infrared camera images show a rapidly evolving splitting and broadening of the divertor heat flux footprints that appear to be correlated with non-axisymmetric divertor currents. In single-null poloidally diverted configurations, these experimental signatures appear to be topologically consistent with a splitting of the separatrix into a set of invariant manifolds resulting in an object known as a homoclinic tangle in dynamical systems theory. Here, we describe a model in which helical currents flowing along this tangle amplify its size and toroidal phase. We compare predictions from this model to experimental measurements of the properties of filament-like structures measured with various DIII-D fast diagnostic systems.

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