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A symplectic map for trajectories of magnetic field lines in double-null divertor tokamaks WILLIE CRANK, HALIMA ALI, ALKESH PUNJABI, Hampton University — The coordinates of the area-preserving map equations for integration of magnetic field line trajectories in tokamaks can be any coordinates for which a transformation to (ψ,θ,ϕ) coordinates exists [A. Punjabi, H. Ali, T. Evans, and A. Boozer, Phys. Lett. A **364**, 140 (2007)]. ψ is toroidal magnetic flux, θ is poloidal angle, and ϕ is toroidal angle. This freedom is exploited to construct a map that represents the magnetic topology of double-null divertor tokamaks. For this purpose, the generating function of the simple map [A. Punjabi, A. Verma, and A. Boozer, Phys. Rev. Lett. **69**, 3322 (1992)] is slightly modified. The resulting map equations for the double-null divertor tokamaks are: x_1=x_0-ky_0(1-y_0^2), y_1=y_0+kx_1. k is the map parameter. It represents the generic topological effects of toroidal asymmetries. The O-point is at (0.0). The X-points are at (0,$\pm$1). The equilibrium magnetic surfaces are calculated. These surfaces are symmetric about the x- and y- axes. The widths of stochastic layer near the X-points in the principal plane, and the fractal dimensions of the magnetic footprints on the inboard and outboard side of upper and lower X-points are calculated from the map.
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