Heteroclinic tangles of the separatrix of double-null map
ASIHA BRAXTON-GARVIN, DANIEL BARNES, JADE JENKINS, ALKESH PUNJABI, HALIMA ALI, Hampton University — The double-null map is the simplest symplectic map that has the generic magnetic topology of double-null divertor tokamaks. The generating function of the double-null map is given by $S(x,y) = x^2/2+y^2/2-y^4/4$. $S = 1/4$ gives the separatrix surface. The scaling of safety factor on the magnetic axis, $q_0$, with map parameter $k$ is used to calculate the number of iterations of the double-null map $N_p$ that is equivalent to a single toroidal circuit of the tokamak. The scaling of root mean square deviation of energy on the $q_{95}$ surface with map parameter $k$ is taken as the estimate of magnetic asymmetry to represent the magnetic perturbation from map parameter $k$. These data is used in the forward and backward double-null maps to calculate the heteroclinic tangles of the ideal separatrix of generic double-null divertor tokamaks from magnetic asymmetries. This work is supported by grants DE-FG02-01ER54624, DE-FG02-04ER54793, and DE-FG02-07ER54937.

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