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Magnet Topology and Homoclinic Tangles in Single-Null Divertor Tokamaks AYANA CRUTCHFIELD, KESSIENA OFUNREIGN, HALIMA ALI, ALKESH PUNJABI, Hampton University — Divertors are a regular feature of the modern day large tokamaks. Divertors are required for handling the plasma particle and heat exhausts on the walls in fusion plasmas. The single-null divertor can have two distinct magnetic topologies: open unbounded topology and closed compact topology. The simple map (SM) [A. Punjabi, A. Verma, and A. Boozer, *Phys. Rev. Lett.* **69**, 3322 (1992)] generically represents open unbounded topology; and the symmetric quartic map (SQM) [M. Jones et al, *Phys. Plasmas* **16**, 042511 (2009)] generically represents the closed compact topology. The parameters in the symmetric quartic map are chosen so that the magnetic geometry of the symmetric quartic map is comparable to the simple map. The new approach for calculation of homoclinic tangles of separatrices in Hamiltonian systems [Punjabi A. and Boozer A., *Phys. Lett. A* **378**, 2410 (2014)] is used. The map parameters of the SM and the SQM are used to represent the magnetic asymmetries as in the standard map. The homoclinic tangles of the primary separatrix of the single-null divertor tokamaks with the two distinct topologies are calculated, compared, and contrasted. This work is supported by grants DE-FG02-01ER54624, DEFG02-04ER54793, and DE-FG02-07ER54937. This research used resources of the NERSC, supported by the Office of Science, US DOE, under Contract No. DE-AC02-05CH11231.

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