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Symmetric Quartic Map in natural canonical coordinates DANIELLE BALDWIN, BILAL JONES, TALISE SETTLE, HALIMA ALI, ALKESH PUNJABI, Hampton University — The generating function for the simple map [A. Punjabi, A. Verma, and A. Boozer, Phys. Rev. Lett. 69, 3322 (1992)] is modified by replacing the cubic term in canonical momentum by a quartic term. New parameters are introduced in the modified generating function to control the height and the width of ideal separatrix surface and the poloidal magnetic flux inside ideal separatrix. The new generating function is the generating function for the Symmetric Quartic Map (SQM) [M. Jones et al, Phys. Plasmas 16, 042511 (2009)]. The new parameters in the generating function are chosen such that the height, width, elongation, and the poloidal flux inside the separatrix for the SQM are same as the simple map. The resulting generating function for the SQM is then transformed from the physical coordinates to the natural canonical coordinates [A. Punjabi, Nucl. Fus. 49, 115020 (2009)]. The equilibrium separatrix of the SQM is calculated in the natural canonical coordinates. The purpose of this research is to calculate the homoclinic tangle of the SQM and compare with the simple map. The separatrix of the simple map is open and unbounded; while the separatrix of the SQM is closed and compact. Motivation is to see what role the topology of the separatrix plays in its homoclinic tangle in single-null divertor tokamaks. This work is supported by grants DE-FG02-01ER54624, DE-FG02-04ER54793, and DE-FG02-07ER54937.

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