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Secondary nontwist phenomena in area-preserving maps

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ABSTRACT

Phenomena as reconnection scenarios, periodic-orbit collisions, and primary shearless tori have been recognized as features of nontwist maps. Recently, these phenomena and secondary shearless tori were analytically predicted for generic maps in the neighborhood of the tripling bifurcation of an elliptic fixed point. In this paper, we apply a numerical procedure to find internal rotation number profiles that highlight the creation of periodic orbits within islands of stability by a saddle-center bifurcation that emerges out a secondary shearless torus. In addition to the analytical predictions, our numerical procedure applied to the twist and nontwist standard maps reveals that the atypical secondary shearless torus occurs not only near a tripling bifurcation of the fixed point but also near a quadrupling bifurcation.

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