
New asymptotics of homoclinic orbits near Bogdanov-Takens bifurcation points.

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Abstract

We derive explicit asymptotics for the homoclinic orbits near a generic Bogdanov-Takens (BT) point, with the aim to continue the branch of homoclinic solutions rooted in the BT point in parameter and state space. We present second-order homoclinic predictors using a generalization of the Poincaré-Lindstedt (P-L) method. The P-L method leads to the same homoclinicity conditions as the classical Melnikov technique [1], the branching method [2] and the regular perturbation method (R-P)[3]. However, the proposed method does not lead to the strange behavior near the saddle point, namely the appearance of a “parasitic turn” in the solution by the R-P method. Also, use these asymptotics to calculate the initial homoclinic cycle to continue homoclinic orbits in two free parameters. The new homoclinic predictors are implemented in the Matlab continuation package MatCont. We show several examples in the case of multidimensional state spaces.

References

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