Accurate heteroclinic orbits and phase space areas JIZHOU LI, STEVEN TOMSOVIC, Washington State Univ. — Accurate calculation of heteroclinic and homoclinic orbits can be of significant importance in some classes of dynamical system problems. Yet for very strongly chaotic systems initial deviations from a true orbit will be magnified by a large exponential rate making direct iteration methods fail quickly. In this presentation, a method is developed that avoids direct calculation of the orbit by making use of the structural stability property of the invariant unstable and stable manifolds. Under an area-preserving map, this property assures that any initial deviation from the stable (unstable) manifold will collapse onto them under backward (forward) iterations of the map. Using a set of judiciously chosen auxiliary points on the manifolds, long orbit segments can be calculated using the stable and unstable manifold intersections of the heteroclinic (homoclinic) tangle. Detailed calculations using the example of the kicked rotor are provided along with verification of the relation between action differences and certain areas bounded by the manifolds.[1,2]

[1] R. S. MacKay, J. D. Meiss, and I. C. Percival, Physica 13D, 55 (1984)
[2] J. D. Meiss, Rev. Mod. Phys. 64, 795 (1992)

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