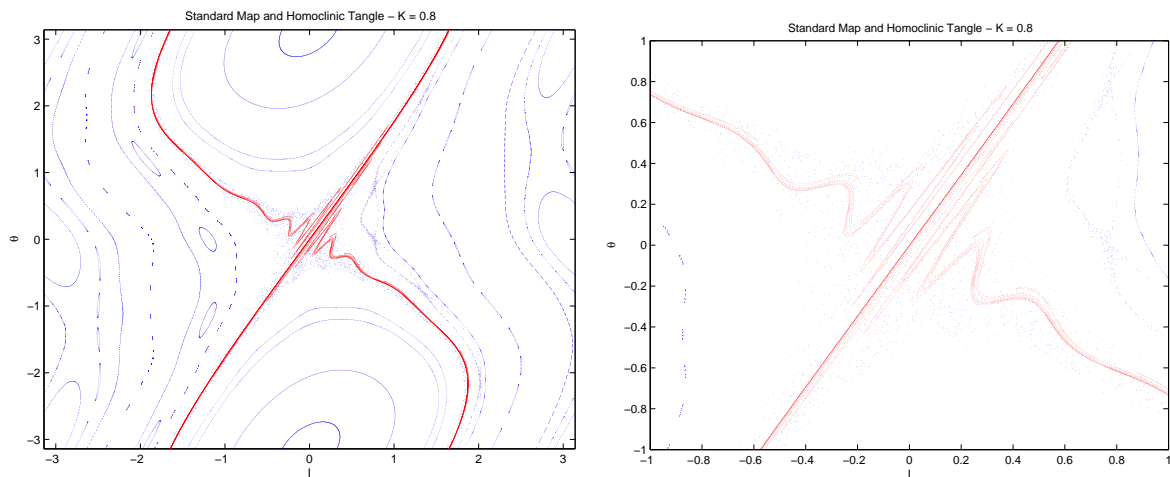


- 4.5: Homoclinic paradox

The seeming paradox of fitting an infinite number of copies of a finite area object in a finite area revolves around the overlapping of these copies. In the homoclinic tangle, although lines of any given manifold never intersect, the figures below show how they pack closer and closer, filling out a finite space. There area within these curves overlap as the curves fit within each other, creating a very fine packing of the space.

- 4.6: Computing homoclinic tangles



These two pictures show the homoclinic tangle overlaid on the standard map for a value of  $K = 0.8$ .

Our main source of error when plotting the homoclinic tangle comes from our linear eigenvector approximation. This error is exponential with our the length along the curves that we are computing, but can be reduced by decreasing our epsilon.

It is unclear whether the homoclinic tangles fill the chaotic regions of the map. While it seems like extending the tangle in the pictures above might indeed fill the chaotic zone, running the simulations of the map extensively can show that some chaotic zones on the standard map are connected, squeezing through gaps in curves that used to be invariant. It is unclear whether the homoclinic tangle also flows through these boundaries, which would determine whether it completely forms the chaotic region or not.