Dynamical Systems and Chaos

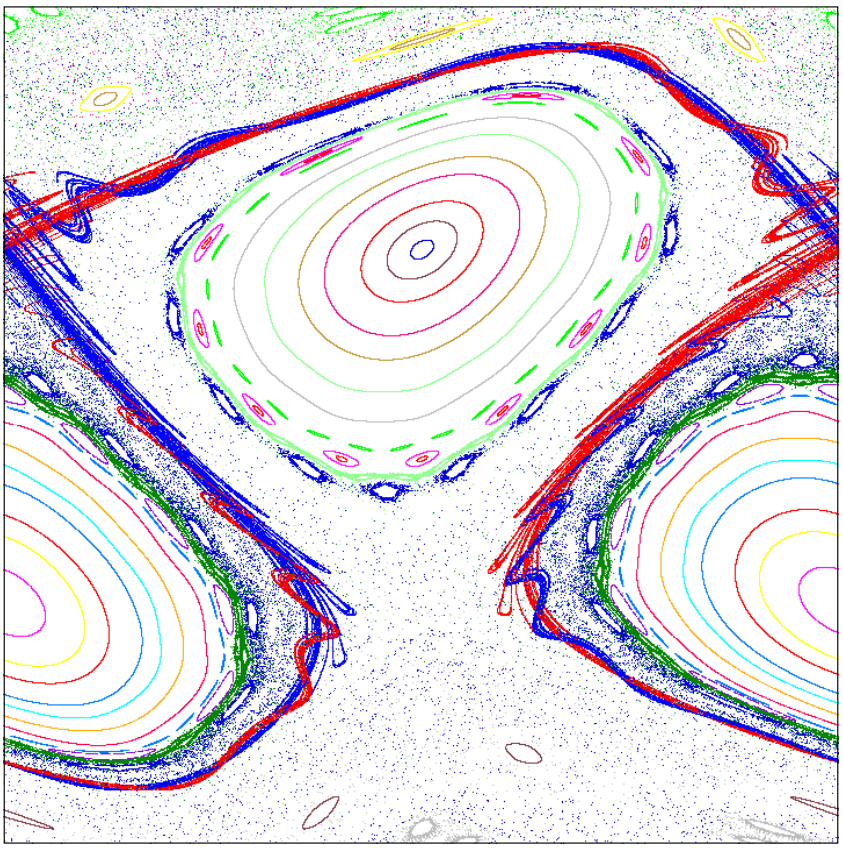
Applied Math 7100 Fall 2017

Class: MWF 11-12
Instructor: J.D. Meiss ECOT 236 jdm@colorado.edu

Prerequisites: Give me a call, email or stop by and we can discuss it.

Text: My Notes, see <http://amath.colorado.edu/faculty/jdm/7100/>
Backup Text: *Dynamical Systems: Stability, Symbolic Dynamics, and Chaos*, C. Robinson.

Topics



Discrete Dynamics in one Dimension
- *Bifurcations*
- *Period Doubling Cascades*
- *Renormalization*

Fixed Points and Periodic Orbits
- *Linearization and Stability*
- *Sinks and Hyperbolic Points*
- *Poincaré-Bendixson Theorem*
- *Stable Manifold Theorem*

Bifurcations and Normal Forms
- *Versal Unfoldings*
- *Saddle-Node, Period Doubling*
- *Pitchfork & Hopf Bifurcations*

Hamiltonian Systems and Symplectic Maps
- *Circle Maps and Arnold Tongues*
- *Action and Variational Principals*
- *Twist Maps and Aubry-Mather Theory*
- *Invariant Circles and Cantori*
- *Diffusion and Transport*

Hyperbolic Sets and Strange Attractors
- *Transitivity, Mixing, Ergodicity, Lyapunov Exponents*
- *Smale's Horseshoe*
- *Anosov Maps and Cat Maps*
- *Fractals and Scaling*