

# **Bifurcation theory (6740)**

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## **I. Topological equivalence and bifurcations: [K] ch. 2, [P] ch. 4,8**

- 1.1 Topological equivalence of dynamical systems
- 1.2 Poincare linearization
- 1.3 Hyperbolic fixed points
- 1.4 Bifurcation diagrams
- 1.5 Normal forms
- 1.6 Center manifolds

## **II Local bifurcations: [K] ch. 3,5,8 [P] ch. 8**

- 2.1 Saddle–node bifurcation
- 2.2 Hopf bifurcation
- 2.3 Projection method for center manifold reduction
- 2.4 Codim-2 bifurcations

## **III Symmetric bifurcation theory: [H] ch. 3,4**

- 3.1 Groups
- 3.2 Group representations
- 3.3 ODEs with symmetry: the equivariant branching lemma
- 3.4 Example: bifurcations in a box
- 3.5 Hopf bifurcations with symmetry

## **IV Pattern formation: [H] ch. 5,7,8**

- 4.1 Convection and Turing patterns
- 4.2 Steady-state bifurcations on a lattice
- 4.3 Amplitude equations
- 4.4 Pattern instabilities

## **Recommended texts**

[K] Yuri Kuznetsov, *Elements of applied bifurcation theory (2nd ed.* (Springer, 1998)

[G] Paul Glendinning, *Stability, instability and chaos* (CUP, 1994)

[H] Rebecca Hoyle, *Pattern formation* (CUP, 2006)