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Classical and Quantum Nonlinear Dynamics, Frühjahrsemester 2024

Points that you will (hopefully) understand by the end of the course

(1) Can a limit cycle exist in a linear system?

(2) Can there be an "8"-shaped limit cycle in a two-dimensional system? In higher dimensions?

(3) Can a system with two degrees of freedom exhibit chaotic behavior? Give your reasons.

(4) Difference between "attracting" and "Lyapunov stable".

(5) "Trajectories cannot intersect". What about saddle points?

(6) Which type of fixed points are possible in a Hamiltonian system?

(7) Difference between a pitchfork bifurcation and a Hopf bifurcation.

(8) Discuss the order parameter of the Kuramoto model.

(9) Kuramoto model: discuss the effect of different distribution functions of the natural frequencies.

(10) How can dissipation be treated in a quantum system?

(11) Transformation to a rotating frame vs. "Rotating wave approximation".

(12)

(13)

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