

Generalization of imaginary parts of eigenvalues: Chain rotation numbers

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Abstract

The spectrum (eigenvalues) of a matrix is a key concept of linear algebra. For the real parts, the so called Lyapunov exponents can be understood as a "dynamical generalization" of them. That means that for linear autonomous differential equations $\dot{x} = Ax$ the Lyapunov exponents reduce to the real parts of the eigenvalues of A . While this concept is quite well proceeded, this cannot be said for the imaginary parts of the eigenvalues. Here the so called chain rotation numbers are introduced as a generalization of the imaginary parts. In fact, for linear autonomous systems $\dot{x} = Ax$ in dimension 2, they reduce to the imaginary parts of the eigenvalues of A . Unfortunately, this is not true for higher dimensions. We will give an answer to the question, how the chain rotation numbers are related to the imaginary parts.
