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Krein signature and Evans function - two useful tools in investigations of spectral stability

v pondělí 17. října 2016 od 12:00 hodin v učebně M5 (ÚMS, PřF MU)

Abstrakt:
The key question in spectral stability of nonlinear waves is the existence of eigenvalues with positive real part of a linearized operator. Two concepts very different in nature proved to be useful in search for such an unstable spectrum: the Evans function, an analytic function with zeros at isolated unstable eigenvalues, and the Krein signature, an algebraic quantity capturing the ability of an eigenvalue to be or to become unstable under a change of a parameter in a system. Although the Evans function does not provide full information about the Krein signature, we show that its simple extension, the Evans-Krein function, allows to calculate the Krein signature of an eigenvalue at almost no additional computational cost. The method used also enables us to give very elegant proofs of eigenvalue counts for linearized Hamiltonians: the Grillakis-Shatah-Strauss criterion, its generalization for systems with broken Hamiltonian symmetry, and a count of real eigenvalues for diagonalizable Hamiltonians originally obtained by Jones. The general results will be demonstrated on detailed examples from fluid dynamics and condense matter physics.

Přednáška potrvá i s případnou diskusí přibližně hodinu. Za organizátory Semináře o diferenciálních rovnicích

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