

Public Abstract

First Name:Alim

Middle Name:

Last Name:Sukhtayev

Adviser's First Name:Yuri

Adviser's Last Name:Latushkin

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Title:The Evans function, the Weyl-Titchmarsh function, and the Birman-Schwinger operators

In recent years the theory of stability of travelling wave solutions for nonlinear evolution equations has grown into a large field that attracts the attention of mathematicians in view of its applications to real-world nonlinear models.

We focus on the spectral stability of travelling wave solutions of partial differential equations. First, we use the Gohberg-Rouche Theorem to prove equality of the algebraic multiplicity of an isolated eigenvalue of an abstract operator on a Hilbert space, and the algebraic multiplicity of the eigenvalue of the corresponding Birman-Schwinger type operator pencil. Next, we apply this result to discuss three particular classes of problems: the Schrodinger operator, the operator obtained by linearizing a degenerate system of reaction diffusion equations about a pulse, and a general high order differential operator.

We also describe relations between the Evans function, a modern tool in the study of stability of traveling waves and other patterns for PDEs, and the classical Weyl-Titchmarsh function for singular Sturm-Liouville differential expressions and for matrix Hamiltonian systems.