

RESEARCH ARTICLE

WILEY

Half inverse problem for diffusion operators with jump conditions dependent on the spectral parameter

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Abstract

In this paper, half inverse problem for diffusion operators with jump conditions dependent on the spectral parameter is considered. The half inverse problems is studied of determining the coefficient and potential functions of the value problem from its spectrum by using the Yang–Zettl and Hocstadt–Lieberman methods. We show that if the functions $p(x)$ and $q(x)$ are prescribed over the semi-interval, then potential functions are determined uniquely by one spectrum on the over interval.

KEYWORDS

differential equations, diffusion operator, inverse problems

1 | INTRODUCTION AND PRELIMINARIES

We consider the diffusion equation of the form

$$l(y) := -y'' + [2\lambda p(x) + q(x)]y = \lambda^2 y, x \in (0, \pi) / \{a_1, a_2\} \quad (1)$$

$$U(y) = y'(0) = 0, V(y) = y(\pi) = 0 \quad (2)$$

$$y(a_1 + 0) = \alpha_1 y(a_1 - 0) \quad (3)$$

$$y'(a_1 + 0) = \beta_1 y'(a_1 - 0) + i\lambda \gamma_1 y(a_1 - 0) \quad (4)$$

$$y(a_2 + 0) = \alpha_2 y(a_2 - 0) \quad (5)$$

$$y'(a_2 + 0) = \beta_2 y'(a_2 - 0) + i\lambda \gamma_2 y(a_2 - 0) \quad (6)$$