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# DISCONTINUOUS STURM-LIOUVILLE PROBLEMS CONTAINING EIGENPARAMETER IN THE BOUNDARY CONDITIONS

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摘要 In this paper, discontinuous Sturm--Liouville problems, which contain eigenvalue parameters both in the equation and in one of the boundary conditions, are investigated. By using an operator-theoretic interpretation we extend some classic results for regular Sturm--Liouville problems and obtain asymptotic approximate formulae for eigenvalues and normalized eigenfunctions. We modify some techniques of [Fulton, C. T., Proc. Roy. Soc. Edin. {\bf 77} (A), 293--308 (1977)], [Walter, J., Math. Z., {\bf 133}, 301--312 (1973)] and [Titchmarsh, E. C., Eigenfunctions Expansion Associated with Second Order Differential Equations I, 2nd edn., Oxford Univ. Pres, London, 1962], then by using these techniques we obtain asymptotic formulae for eigenelement norms and normalized eigenfunctions.

关键词 Sturm--Liouville problem discontinuous boundary-value problem eigenvalue and eigenfunction eigenelement normalized eigenfunctions

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**Abstract** In this paper, discontinuous Sturm--Liouville problems, which contain eigenvalue parameters both in the equation and in one of the boundary conditions, are investigated. By using an operator-theoretic interpretation we extend some classic results for regular Sturm--Liouville problems and obtain asymptotic approximate formulae for eigenvalues and normalized eigenfunctions. We modify some techniques of [Fulton, C. T., Proc. Roy. Soc. Edin. {\bf 77} (A), 293--308 (1977)], [Walter, J., Math. Z., {\bf 133}, 301--312 (1973)] and [Titchmarsh, E. C., Eigenfunctions Expansion Associated with Second Order Differential Equations I, 2nd edn., Oxford Univ. Pres, London, 1962], then by using these techniques we obtain asymptotic formulae for eigenelement norms and normalized eigenfunctions.

**Key words** Sturm--Liouville problem discontinuous boundary-value problem eigenvalue and eigenfunction eigenelement normalized eigenfunctions

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