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On the inverse Sturm-Liouville problem. (English) Zbl 0568.65056
J. Fac. Sci., Univ. Tokyo, Sect. I A 31, 319-350 (1984).

The problem of the determination of a function $q(x)$ and numbers $h, H \in R$ such that the Sturm-Liouville problem (1) $y'' + (\lambda - q(x))y = 0, 0 < x < \pi$, (2) $y'(0) - hy(0) = 0, y'(\pi) + Hy(\pi) = 0$ has given spectral characteristics $\{\lambda_n, \rho_n\}_{n=0}^{\infty}$ is considered (λ_n is the n -th eigenvalue and $\rho_n = \int_0^{\pi} (\phi(x, \lambda_n))^2 dx$ where $\phi(x, \lambda_n)$ is the eigenfunction satisfying the initial condition $u(0) = 1, u'(0) = h$). A new proof on the theorem of *I. M. Gel'fand* and *B. M. Levitan* [Izv. Akad. Nauk SSSR, Ser. Mat. 15, 309-360 (1951; Zbl 0044.093)] of the solvability of the above inverse problem is presented. Moreover, it is proved that this inverse problem is well-posed, i.e. if two different spectral characteristics of two problems (1) with the same boundary conditions (2) are close in a certain sense, then the difference between the coefficients of equations is small.

Reviewer: [T.Reginska](#)

MSC:

- [65L15](#) Numerical solution of eigenvalue problems involving ordinary differential equations
- [34A55](#) Inverse problems involving ordinary differential equations
- [34L99](#) Ordinary differential operators

Cited in 7 Documents

Keywords:

[inverse Sturm-Liouville problem](#); [spectral characteristics](#); [wellposedness](#)