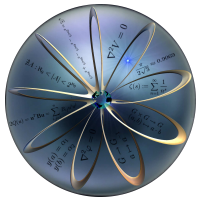

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eigenfunction

Canonical name	Eigenfunction
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Entry type	Definition
Classification	msc 34B24
Synonym	characteristics function
Defines	solution of system

Consider the Sturm-Liouville system given by

$$\frac{d}{dx}\left[p(x)\frac{dy}{dx}\right] + q(x)y + \lambda r(x)y = 0 \qquad a \leq x \leq b \tag{1}$$

$$a_1 y(a) + a_2 y'(a) = 0, \qquad b_1 y(b) + b_2 y'(b) = 0, \tag{2}$$

where $a_i, b_i \in \mathbb{R}$ with $i \in \{1, 2\}$ and $p(x), q(x), r(x)$ are differentiable functions and $\lambda \in \mathbb{R}$. A non zero solution of the system defined by (**??**) and (**??**) exists in general for a specified λ. The functions corresponding to that specified λ are called eigenfunctions.

More generally, if D is some linear differential operator, and $\lambda \in \mathbb{R}$ and f is a function such that $Df = \lambda f$ then we say f is an eigenfunction of D with eigenvalue λ.