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Numerical Computation of Sturm-Liouville Problem with Robin Boundary Condition

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Abstract : The modelling of physical phenomena, such as the earth's free oscillations, the vibration of strings, the interaction of atomic particles, or the steady state flow in a bar give rise to Sturm-Liouville (SL) eigenvalue problems. The boundary applications of some systems like the convection-diffusion equation, electromagnetic and heat transfer problems requires the combination of Dirichlet and Neumann boundary conditions. Hence, the incorporation of Robin boundary condition in the analyses of Sturm-Liouville problem. This paper deals with the computation of the eigenvalues and eigenfunction of generalized Sturm-Liouville problems with Robin boundary condition using the finite element method. Numerical solutions of classical Sturm–Liouville problems are presented. The results show an agreement with the exact solution. High results precision is achieved with higher number of elements.

Keywords : Sturm-Liouville problem, Robin boundary condition, finite element method, eigenvalue problems
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