Seminário em Engenharia Matemática

Meltem Adiyaman

Departamento de Matemática, Universidade de Dokuz Eylul - Turquia

Título:
Numerical solutions of eigenvalue problems.

Resumo:

The boundary problem

$$\Delta y + \lambda e^{y} = 0,$$

where $y = 0$ on the boundary is often referred to as "the Bratu Problem". It is nonlinear eigenvalue problem with two known bifurcated solutions for $\lambda < \lambda_c$, no solutions for $\lambda > \lambda_c$ and a unique solution when $\lambda = \lambda_c$. In this study, Taylor's Decomposition method is introduced for solving one dimensional Bratu Problem. The numerical scheme is based on the application of the Taylor's decomposition to the first order differential equation system. The technique is illustrated with three numerical examples and the results show that the method converges rapidly and approximates the exact solution very accurately without using small step-size.