AN APPROXIMATION METHOD FOR SECOND ORDER NONLINEAR VALUE POLYLOCAL PROBLEMS

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2000 Mathematics Subject Classification. 65D07, 34B15, 65F50, 49M15.

Keywords and phrases. B-splines, nonlinear boundary value problems, sparse matrices, Newton method.

Consider the problem:

$$\begin{aligned} y''(x) + f(x,y) &= 0, \qquad x \in [0,1] \\ y(a) &= \alpha \\ y(b) &= \beta, \qquad a, b \in (0,1). \end{aligned}$$

This is not a two-point boundary value problem since $a, b \in (0,1)$. It is possible to solve this problem by dividing it into the three problems: a two-point boundary value problem (BVP) on $[a,b]$ and two initial-value problems (IVP), on $[0,a]$ and $[b,1]$. The aim of this work is to present two solution procedures which are obtained using B-spline of order (k+1) [5, 4] scheme [1, 2] and a combined methods B-spline(order k+1) with Runge-Kutta (k-stage) and compare them by meaning of errors and costs. Our methods are implemented in MATLAB using Spline Toolbox [3] and also verified numerically.

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