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Abstract

In this paper a finite element method involving Petrov-Galerkin method with quintic B-splines as basis functions and septic B-splines as weight functions has been developed to solve a general seventh order boundary value problem with a particular case of boundary conditions. The basis functions are redefined into a new set of basis functions which vanish on the boundary where the Dirichlet and the Neumann type of boundary conditions are prescribed. The weight functions are also redefined into a new set of weight functions which in number match with the number of redefined basis functions. The proposed method was applied to solve several examples of seventh order linear and nonlinear boundary value problems. The obtained numerical results were found to be in good agreement with the exact solutions available in the literature.

References

References

- Richards G and P. R. R. Sarma, Reduced order models for induction motors with two rotor circuits, IEEE Transactions on Energy Conversion, 9(4) (1994), pp. 673-678.
- R. P. Agarwal, 1986, Boundary Value Problems for Higher Order Differential Equations,

World Scientific, Singapore.

- Shahid S. Siddiqi, Ghazala Akram and Muzammal Iftikhar, Solution of seventh order boundary value problem by Differential Transformation method, World Applied Sciences Journal, 16(11) (2012), pp. 1521-1526.
- Shahid S. Siddiqi, Ghazala Akram and Muzammal Iftikhar, Solution of seventh order boundary value problems by Variational iteration technique, Applied Mathematical Sciences, 6(94) (2012), pp. 4663-4672.
- Shahid S. Siddiqi and Muzammal Iftikhar, Variational Iteration method for the solution of seventh-order boundary value problems using He's polynomials, Journal of the Association of Arab Universities for Basic and Applied Sciences <http://dx.doi.org/10.1016/j.jaubas.2014.03.001> (2014).
- Shahid S. Siddiqi and Muzammal Iftikhar, Solution of seventh order boundary value problems by the Adomain decomposition method, <http://arxiv.org/abs/1301.3603v1> (2013).
- Shahid S. Siddiqi and Muzammal Iftikhar, Numerical solution of Higher order boundary value problems by Homotopy analysis method, Abstract and Applied Analysis, Article Id 427521 (2013) , pp. 1-12.
- Shahid S. Siddiqi and Muzammal Iftikhar, Solution of seventh order boundary value problems by Variation parameters method, Research Journal of Applied Sciences, Engineering and Technology, 5(1) (2013), pp. 176-179.
- Shahid S. Siddiqi and Muzammal Iftikhar, Variational iteration Homotopy perturbation method for the Solution of seventh-order boundary value problems, <http://arxiv.org/abs/1310.2915v1> (2103).
- Mustafa Inc and Ali Akgul, Numerical solution of seventh order boundary value problems by a Novel method, Abstract and Applied Analysis, Article Id 745287 (2014), pp. 1-9.
- Ghazala Akram and Hamood Ur Rehman, Numerical solution of seventh order boundary value problems using the Reproducing kernel space, Research Journal of Applied Sciences, Engineering and Technology, 7(4) (2014), pp. 892-896.
- R. E. Bellman and R. E. Kalaba, 1965, Quasilinearization and Nonlinear Boundary Value Problems, American Elsevier, New York.
- L. Bers, F. John and M. Schechter, 1964, Partial Differential Equations, John Wiley Inter science, New York,.
- J. L. Lions and E. Magenes, 1972, Non-Homogeneous Boundary Value Problem and Applications. Springer-Verlag, Berlin.
- A. R. Mitchell and R. Wait, 1997, The Finite Element Method in Partial Differential Equations, John Wiley and Sons, London.
- P. M. Prenter, Splines and Variational Methods, 1989, John-Wiley and Sons, New York.
- Carl de-Boor, 1978, A Practical Guide to Splines, Springer-Verlag.
- I. J. Schoenberg, 1966, On Spline Functions, MRC Report 625, University of Wisconsin.

Index Terms

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Keywords

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