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CUBIC B-SPLINE COLLOCATION METHOD FOR FIFTH ORDER BOUNDARY VALUE PROBLEMS

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Abstract

A finite element method involving collocation method with cubic B-splines as basis functions have been developed to solve fifth order boundary value problems. The third order, fourth order and fifth order derivatives for the dependent variable are approximated by the finite differences of second order derivatives. The basis functions are redefined into a new set of basis functions which in number match with the number of collocated points selected in the space variable domain. The proposed method is tested on several linear and non-linear boundary value problems. The solution of a non-linear boundary value problem has been obtained as the limit of a sequence of solutions of linear boundary value problems generated by quasilinearization technique. Numerical results obtained by the present method are in good agreement with the exact solutions available in the literature.

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Key Words : Collocation method, Cubic B-spline, Basis function, Fifth order boundary value problem, Absolute error.

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