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Md Shafiqul Islam* (mdshafiqul@yahoo.com), Department of Mathematics, University of Dhaka, Dhaka, 1000, Bangladesh. *Numerical solutions of fourth order boundary value problems using Bernoulli polynomials*. Preliminary report.

The aim of this talk is to find the numerical solutions of the fourth order linear and nonlinear boundary value problems using piecewise Bernoulli polynomials. We derive the Bernoulli polynomials explicitly over the interval $[0, 1]$ to satisfy the given boundary conditions. To the knowledge of the author's, none has used these polynomials to solving differential equations so far. These polynomials can be differentiated and integrated easily, and are thus treated as linear combination to the approximate solutions in the Galerkin weighted residual method. Details mathematical formulation is provided to describe how these polynomials are used to obtain highly accurate solutions to the BVP. All the formulas are verified through numerical examples. The obtained approximate solutions are compared with the exact solutions, and with the solutions of the existing methods. It is found that if we increase the number of polynomials, the approximate solutions converge to the exact solutions monotonically even with desired large significant digits. (Received September 21, 2009)