1067-49-564 **Mohsen Razzaghi*** (razzaghi@math.msstate.edu), Department of Mathematics & Statistics, Mississippi State University, Mississippi State, MS 39762. *Numerical solution for nonlinear differential equations via combined block-pulse and orthogonal functions.*

Depending on the structure, the orthogonal functions may be widely classified into three families: The first includes sets of piecewise constant basis functions (PCBF), (e.g., block-pulse, Haar, Walsh, etc.). The second consists of sets of orthogonal polynomials (e.g., Chebyshev, Laguerre, Legendre etc.). The third are widely used sets of sine-cosine functions in the Fourier series. While orthogonal polynomials and sine-cosine functions together form a class of continuous basis functions, PCBF's have discontinuities or jumps. Among PCBF's, block-pulse functions are found to be very attractive, in view of their properties of simplicity and disjointedness. In this work, we present a new direct computational method to solve nonlinear differential equations. The approach is based of reducing the nonlinear differential equations into a set of algebraic equations by first expanding the candidate function as a hybrid function with unknown coefficient. The hybrid function which consists of combined block-pulse and orthogonal functions, are first introduced. Some properties together with illustrative examples are given. (Received September 09, 2010)