1056-33-369 **Mohsen Razzaghi*** (razzaghi@math.msstate.edu), Department of Mathematics & Statistics, Mississippi State University, Mississippi State, MS 39762. *Solution for nonlinear initial-value problems via orthogonal functions.*

Orthogonal functions have received considerable attention in dealing with various problems of dynamic systems. The main characteristic of this technique is that it reduces these problems to those of solving a system of algebraic equations, thus greatly simplifying the problem. The approach is based on converting the underlying differential equations into an integral equation through integration, approximating various signals involved in the equation by truncated orthogonal series, and using the operational matrix of integration to eliminate the integral operations. In this talk, a numerical method for solving the nonlinear ordinary differential equations with initial conditions is proposed. The approach is based upon hybrid function approximations. The properties of hybrid functions, which consist of block-pulse and Legendre polynomials, are presented. The associated operational matrix of integration is then utilized to reduce the solution of the initial-value problems to the solution of a system of algebraic equations. The method is easy to implement and computationally very attractive. Applications are demonstrated through an illustrative example. (Received September 02, 2009)