1077-49-634   **Mohsen Razzaghi*** (`razzaghi@math.msstate.edu`), Department of Mathematics and Statistics, Mississippi State University, Mississippi State, MS 39762. *Solution of optimal control problems via combined block-pulse functions and polynomial series.*

Orthogonal functions and polynomial series have been used when dealing with various problems of the dynamical systems. The main advantage of using orthogonal functions and polynomial series is that they reduce the dynamical system problems to those of solving a system of algebraic equations. The approach is based on converting the underlying differential equation into an integral equation through integration, approximating various signals involved in the equation by truncated orthogonal functions and polynomial series, and using the operational matrix of integration to eliminate the integral operations. This matrix can be uniquely determined based on the particular orthogonal functions and polynomial series. In this work, we present a new direct computational method to solve optimal control problems. The approach is based of reducing the optimal control problems into a set of algebraic equations by first expanding the candidate function as a combined block-pulse functions and polynomial series with unknown coefficients. The operational matrix of integration is then utilized to evaluate the unknown coefficients and find the solution of optimal control problems. Some properties together with illustrative examples are given. (Received September 08, 2011)

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