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**Mohsen Razzaghi\*** ([razzaghi@math.msstate.edu](mailto:razzaghi@math.msstate.edu)). *Polynomial series direct method for problems in the calculus of variations.*

Orthogonal functions and polynomial series, often used to represent an arbitrary time function, have been used in the last several years to solve various problems of dynamical 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 functions or polynomial series and using the operational matrix of integration, to eliminate the integral operations. The direct methods of Ritz and Galerkin in solving variational problems are well known. In this talk the Taylor series expansion is first used to solve a calculus of variation problem. It will be seen that to obtain the Taylor series coefficients we need to use an ill-conditioned matrix and hence the Taylor series are not suitable for the solution of a class of calculus of variations problems. Alternative approaches with satisfactory results are given. (Received September 05, 2014)