On the approximate solutions of systems of odes by legendre operational matrix of differentiation

Abstract

In this article, a general framework for solving system of ordinary differential equations by implementing a relatively new numerical technique called the Legendre operational matrix of differentiation is presented for the first time. This method can be an effective procedure to obtain analytic and approximate solutions for different systems of ordinary differential equations. Different from other numerical techniques, shifted Legendre polynomials and their properties are employed for deriving a general procedure for forming this matrix. Comparisons are made between approximate solutions, exact solutions and numerical ones for several examples. Moreover, estimate error for the given algorithm is presented