NUMERICAL SOLUTIONS FOR FRACTIONAL RICCATI DIFFERENTIAL EQUATION USING LEGENDRE SPECTRAL COLLOCATION METHOD

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Abstract

In the present study, an approximate formula of the fractional derivatives is derived. The proposed formula is based on the Legendre polynomials. The fractional derivatives are presented in terms of Caputo sense. The proposed spectral Legendre collocation method is presented for solving fractional Riccati differential equation (FRDE). The properties of Legendre polynomials approximation are used to reduce FRDE to solve a system of algebraic equations which solved using a suitable numerical method. Numerical results are provided to confirm the theoretical results and the efficiency of the proposed method.

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