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A new approach for solving fractional differential-algebric equations

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Abstract

In this paper, the Bezier curves method is implemented to give approximate solutions for fractional differential-algebraic equations (FDAEs). This methods in applied mathematics can be used as approximated method for obtaining approximate solutions for different types of fractional differential equations. An illustrative example is included to demonstrate the validity and applicability of the suggested approach.
Mathematical subject classification: 65K10, 26A33, 49K15.

Keywords: Fractional differential-algebraic equations (FDAEs), Numerical solution, Bezier method.

1. Introduction

Fractional modeling in differential equations has gained considerable popularity and importance during the past three decades or more. Besides, Differential-Algebraic Equations (DAEs) have been successfully used to characterize for many physical and engineering topics such as polymer physics, fluid flow, electromagnetic theory, dynamics of earthquakes, rheology, viscoelastic materials, viscous damping and seismic analysis. Also differential-algebraic equations with fractional order have been made in some mathematical models in recent times. As known, fractional differential-algebraic equations usually do not have exact solutions. Therefore, approximations and numerical techniques must be used for them and also the solution of these equations has been an attractive subject for many researchers [1].
Many physical problems are governed by a system of differentialalgebraic equations (DAEs), and the solution of these equations has been a subject of many investigators. Recently, many important mathematical models have