Systems and Control Group Seminar

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Room 11.2.6 (Sousa Pinto)

Mathematics Department, University of Aveiro

Collocation methods for a class of singular fractional differential equations

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Abstract

In this work, we investigate a class of singular fractional differential equations (SFDEs). First, the underlying problem is reformulated as a corresponding Volterra integral equation. Based on this reformulation, we study the existence and uniqueness of solutions to the SFDE and propose a standard spline collocation method on a uniform grid to compute approximate solutions. The applicability of this method is examined in detail. Furthermore, a modified spline collocation method is introduced for cases in which the standard approach fails. A comprehensive convergence analysis is provided for both methods. Finally, several numerical experiments are presented to demonstrate the accuracy and effectiveness of the proposed approaches.

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