Review of: "A Novel Computational Approach for Solving Fully Implicit Singular Systems of Ordinary Differential Equations"

Babak Shiri[1]

1 Tabriz University

Potential competing interests: No potential competing interests to declare.

This paper is devoted to a semi-analytical solution of a fully implicit differential equation with point singularity.

The systems of the differential equations may be categorized into diverse singularities.

We take the authors' attention to the following paper:

“Index definitions for nonlinear IAEs and DAEs: new classifications and numerical treatments”

This paper’s novelty is the combination of the Adomian Decomposition method with differential transform for solving Singular ODE.

The method is explained in Theorem 1 for the first-order singular ODE and in Theorem 2 for the second-order singular ODE. Several illustrative examples are accompanied.

For DTM there are many applied works for example:

A note on using the Differential Transformation Method for the Integro-Differential Equations

Applied Mathematics and Computation 219 (14), 7306-7309, 2013

For Adomian Decomposition also see:

Numerical solution of fractional differential equation in a model of HIV infection of CD4 (+) T Cells

International Journal of Applied Mathematics and Statistics 56, 23-32, 2017

As we mentioned above, the singularity can be diverse, it can be in an interval, Such a singular equation is known as DAE. I want the author to add a review of such works to take notice of readers for a wider view of the singularity phenomena in ODE. See also

Numerical solution of higher index DAEs using their IEA's structure: Trajectory-prescribed path control problem and simple pendulum

Caspian Journal of Mathematical Sciences (CJMS) 7 (1), 1-15, 2018

See also advanced work such as

System of fractional differential-algebraic equations with applications

Chaos, Solitons & Fractals 120, 203-212, 2019.

Comment:

- Explain how (19) is obtained from (18).