

Numerical Methods for a Class of Hybrid Weakly Singular Integro-Differential Equations

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Abstract

This paper proposes numerical methods for solving hybrid weakly singular in-tegro-differential equations of the second kind. The terms in these equations are in the following order: derivative term of a state, integro-differential term of a state with a weakly singular kernel, a state, integral term of a state with a smooth kernel, and force. The original class of weakly singular integro-differential equations of the first kind is derived from aeroelasticity mathematical models. Among the proposed methods, the method for solving linear cases is fully based on previously reported approximation scheme for equations of the first kind. For nonlinear cases, a revised method is proposed. Examples are presented to demonstrate the effectiveness of the proposed methods, and the results indicate that the proposed methods facilitate achieving satisfactory and accurate approximations.

Keyword : Hybrid, Weakly singular, Integro-differential equations