



جامعة الإمارات العربية المتحدة  
United Arab Emirates University

The College of Graduate Studies and the College of Science Cordially Invite  
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**Master Thesis Defense**

Entitled

*A COMPUTATIONAL METHOD FOR SOLVING A CLASS OF FRACTIONAL NON-LINEAR  
SINGULARLY PERTURBED VOLTERRA INTEGRO-DIFFERENTIAL BOUNDARY-VALUE PROBLEMS*

by

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Date & Venue

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Abstract

In this thesis, we present a computational method for solving a class of fractional singularly perturbed Volterra integro-differential boundary-value problems with a boundary layer at one end. The implemented technique consists of solving two problems which are a reduced problem and a boundary layer correction problem. The reproducing kernel method is used to the second problems. The Pade' approximation technique is used to satisfy the conditions at infinity. Existence and uniformly convergence for the approximate solution will be investigated. Numerical results will be presented to show the efficiency of the proposed method.

**Keywords:** Singularly perturbed Volterra integro-differential, Caputo fractional derivative, nonlinear initial value problem.