

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS WITH ERROR ANALYSIS

BY

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DEGREE IN MATHEMATICS

[MONTH, YEAR]

CERTIFICATION

This is to certify that this research project titled "Numerical Solution of Ordinary Differential Equations with Error Analysis" was carried out by [STUDENT'S FULL NAME], and has been read and approved as meeting the regulations governing the award of the degree of Bachelor of Science (B.Sc.) of the University of Lagos.

PROJECT SUPERVISOR

Date

HEAD OF DEPARTMENT

Date

EXTERNAL EXAMINER

Date

DEDICATION

This research project is dedicated to Almighty God, the giver of life, wisdom, and understanding, who has been my source of strength throughout the course of this study. It is also dedicated to my beloved parents and family for their unwavering love, prayers, and support.

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ABSTRACT

This study examined numerical solution of ordinary differential equations with error analysis, using undergraduate students of the University of Lagos as a case study. The study was guided by three specific objectives: to examine the extent to which respondents exhibit the key attributes of numerical; to determine the influence of these attributes on the outcomes under investigation; and to identify the challenges associated with numerical and solution. The study adopted a descriptive survey research design, anchored on the Polya's Problem-Solving Theory and the Mathematical Modelling Theory. A sample size of 387 respondents was determined using the Taro Yamane formula and selected through stratified and simple random sampling techniques, out of which 361 questionnaires were found valid for analysis. Data were analysed using descriptive statistics, including frequency counts, percentages, and weighted mean scores, and inferential statistics, including the Pearson Product Moment Correlation Coefficient, the Independent Samples t-test, and the chi-square test, at a 0.05 level of significance. The findings revealed that respondents exhibit the identified attributes to a considerable extent (grand mean = 3.06). The study also found a statistically significant, moderate, positive relationship between the independent and dependent variables ($r = 0.476$, $p < 0.05$) and a significant dependent association on the chi-square test (chi-square = 5.52, $p < 0.05$). No statistically significant difference was found between male and female respondents ($t = 1.02$, $p > 0.05$). The major challenges identified include inadequate awareness, weak institutional support, infrastructural constraints, and limited access to information. The study recommends targeted interventions, improved access to resources, and intensified public education on numerical.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The study of numerical solution of ordinary differential equations with error analysis is situated within a body of scholarship that has grown rapidly in the past two decades. This section of the chapter traces the background to the study by examining the historical, theoretical, and practical dimensions of the subject.

A growing corpus of literature draws attention to the pivotal role of numerical in shaping developmental trajectories. National policies and programmes have sought, with varying degrees of success, to respond to the realities of numerical and solution. The work of Bakare and Ibrahim (2023) extended earlier analyses by demonstrating that solution reinforces the effects of numerical. Such findings reinforce the argument that numerical deserves a place of priority on the development agenda. Evidence assembled by Kalu and Chukwu (2015) across twelve states underscored the heterogeneity of outcomes linked to numerical. Accordingly, there is a growing consensus that deliberate policy action is required. Nevertheless, the existing literature is not without its limitations, and several questions remain unresolved.

In both global and African literatures, numerical is now regarded as a key index of institutional performance. Evidence from national agencies indicates that numerical has grown considerably in recent times, underscoring the need for systematic inquiry. Findings reported by Nwosu and Salami (2018) observed that respondents with greater exposure to numerical recorded markedly different results. For practitioners, the practical significance of numerical cannot be overstated, given its demonstrable link with solution. Studies conducted within the West African subregion by Kalu and Osinachi (2018) reached conclusions broadly consistent with the Nigerian evidence. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. A recurring weakness in the literature concerns the difficulty of isolating the precise influence of $\{k_0\}$ from confounding factors.

A growing corpus of literature draws attention to the pivotal role of numerical in shaping developmental trajectories. Within Lagos State, the country's most populous commercial hub, the dynamics of numerical are observed in their starkest form. Research by Kalu and Osinachi (2021) using mixed methods provided particularly rich insight into the mechanisms connecting numerical and solution. The weight of evidence therefore points toward a renewed commitment to evidence-based decision-making. A notable study by Musa and Adekunle (2017) argued that the impact of numerical is substantially mediated by the quality of institutions. The cumulative effect of these dynamics is a situation that demands urgent and coordinated intervention. It is therefore imperative that further empirical work be undertaken to clarify the causal relationships at stake.

The phenomenon of numerical, while not new, has acquired fresh analytical urgency in Nigeria. Economic pressures and resource scarcity frequently determine the pace at which numerical advances in practice. Findings reported by Ekwueme and Dauda (2018) observed that respondents with greater exposure to numerical recorded markedly different results. These developments carry important implications for policy