



Spectral Methods and Condition-Number Analysis for Nonlinear Differential Equations in Telecom Network Reliability in Kenya

Omar Kibet^{1,2}, Mwangi Ngugi³, Kamau Mutua⁴

¹ Department of Interdisciplinary Studies, Kenya Agricultural and Livestock Research Organization (KALRO)

² Department of Interdisciplinary Studies, International Centre of Insect Physiology and Ecology (ICIPE), Nairobi

³ Department of Research, African Population and Health Research Center (APHRC)

⁴ International Centre of Insect Physiology and Ecology (ICIPE), Nairobi

Published: 10 September 2005 | **Received:** 01 April 2005 | **Accepted:** 21 July 2005

Correspondence: okibet@hotmail.com

DOI: [10.5281/zenodo.18813559](https://doi.org/10.5281/zenodo.18813559)

Author notes

Omar Kibet is affiliated with Department of Interdisciplinary Studies, Kenya Agricultural and Livestock Research Organization (KALRO) and focuses on Mathematics research in Africa.

Mwangi Ngugi is affiliated with Department of Research, African Population and Health Research Center (APHRC) and focuses on Mathematics research in Africa.

Kamau Mutua is affiliated with International Centre of Insect Physiology and Ecology (ICIPE), Nairobi and focuses on Mathematics research in Africa.

Abstract

This article explores the application of spectral methods and condition-number analysis in solving nonlinear differential equations to enhance telecom network reliability in Kenya. Spectral methods will be employed to approximate solutions of these equations. Condition-number analysis will be used to assess the sensitivity of solutions with respect to perturbations in parameters. The theoretical framework developed can aid in designing more robust telecom networks by predicting and mitigating sensitivity issues through early detection and adjustment of parameters. Telecom operators should leverage this framework for continuous monitoring and adaptation of network configurations, thereby enhancing overall system reliability. The analytical core is $\hat{y} = \mathcal{F}(x; \theta)$ with $\hat{\theta} = \operatorname{argmin}_{\theta} L(\theta)$, and convergence is established under standard smoothness conditions.

Keywords: Kenya, Nonlinear Equations, Spectral Methods, Condition Numbers, Stability Analysis, Differential Equations, Network Reliability

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

✉ **REQUEST FULL PAPER**

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge