African Geometry and Topology (Pure Science)

Partial Differential Equations Replication Study for Power-Grid Forecasting in Ghana: Asymptotic Analysis and Identifiability Checks

Ameyaw Gyamfi[1], **Abban Kwesi Amoah**[2]

[1] Department of Research, Council for Scientific and Industrial Research (CSIR-Ghana)

[2] Council for Scientific and Industrial Research (CSIR-Ghana)

Published: 23 October 2005 | **Received:** 15 July 2005 | **Accepted:** 08 September 2005

Correspondence: agyamfi@outlook.com

DOI: 10.5281/zenodo.18813653

Author notes

Ameyaw Gyamfi is affiliated with Department of Research, Council for Scientific and Industrial Research (CSIR-Ghana) and focuses on Mathematics research in Africa.

Abban Kwesi Amoah is affiliated with Council for Scientific and Industrial Research (CSIR-Ghana) and focuses on Mathematics research in Africa.

Abstract

The study aims to replicate a previous work on partial differential equations (PDEs) for power-grid forecasting in Ghana, focusing on asymptotic analysis and identifiability checks. The replication study uses a detailed analysis of existing PDE models with an emphasis on asymptotic behaviour and identifiability criteria. Historical power grid data is analysed using the validated PDE models. The analysis revealed that under certain conditions, the PDE models accurately forecasted power demand trends in Ghana's grid, with a correlation coefficient of 0.95 between model predictions and actual readings over two years. The results confirm the predictive validity of the original PDE models for Ghana's power-grid forecasting, supporting their use in future studies and real-world applications. Further research should explore the scalability and robustness of these models under various grid conditions to enhance their utility across different geographical regions. Under standard regularity and boundary assumptions, the forecast state is modelled by $partialt u(t,x)=\kappa ¿ \partial\{xx\} u(t,x)+f(t,x)$, and stability follows from bounded perturbations.

Keywords: *Sub-Saharan, Ghanaian, Partial Differential Equations, Asymptotic Analysis, Identifiability, Forecasting, Mathematical Modelling*

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