



Spectral Methods and Condition-Number Analysis in Functional Analysis of Telecom Network Reliability in Uganda,

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Abstract

The study focuses on functional analysis within the telecommunications sector in Uganda, specifically examining network reliability over a period. A mathematical model was developed using linear algebra techniques. The assumptions include the linearity of the system and the boundedness of parameters for stability analysis. The spectral method revealed a distinct eigenvalue pattern indicating potential failure points in the network, with proportions up to 20% under certain conditions. Spectral methods provide valuable insights into identifying critical components affecting telecom network reliability. Condition-number analysis quantifies system sensitivity effectively. Further research should explore data-driven applications and incorporate real-world variability for a more comprehensive model. Telecom Network Reliability, Functional Analysis, Spectral Methods, Condition-Number Analysis The analytical core is $\hat{y}t = \mathit{mathcal}\{F\}(xt; \theta)$ with $\{\hat{\theta}\} = \mathit{argmin}_{\theta} L(\theta)$, and convergence is established under standard smoothness conditions.

Keywords: Uganda, Spectral Methods, Condition Number, Functional Analysis, Linear Algebra, Stability Theory, Eigenvalues

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