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Stability Analysis and Convergence Proofs of Dynamical Systems for Telecom Network Reliability in Uganda

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Abstract

The reliability of telecom networks is critical for economic development in Uganda. Current models often fail to account for dynamic changes and uncertainties. We employ mathematical modelling to simulate network dynamics, focusing on stability analysis and convergence proofs. Key assumptions include linearity and bounded disturbances. A key finding is the emergence of a stable equilibrium point in all simulations, indicating reliable network operation over time. Our models demonstrate robustness against common perturbations, setting a foundation for future research and practical applications in Uganda's telecom sector. Immediate implementation of these models could significantly improve telecom services reliability in Uganda. Stability Analysis, Dynamical Systems, Telecom Network Reliability, Uganda The analytical core is $\hat{\{ y \}t = mathcal\{F\}(xt ; \theta)}$ with $\hat{\{\theta\}} = argmin_{\theta} L(\theta)$, and convergence is established under standard smoothness conditions.

Keywords: *Uganda, Dynamical Systems, Stability Analysis, Convergence Proofs, Network Dynamics, Uncertainty Quantification, Chaos Theory*

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