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Computational Simulations of Fluid Dynamics in Nigerian Water Management Systems

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Abstract

The Nigerian water management systems face significant challenges due to inadequate infrastructure and inefficient resource allocation. Computational Fluid Dynamics (CFD) simulations were conducted using the Reynolds-Averaged Navier-Stokes (RANS) model with uncertainty quantification through Monte Carlo sampling. Simulations revealed a 15% reduction in water loss due to leakage when optimised flow control strategies were applied. The computational models provided insights into optimising the distribution networks, leading to more effective resource management. Implementing these optimization measures requires stakeholder collaboration and investment in upgrading infrastructure. Water Management, Fluid Dynamics, Computational Physics, Optimization The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Nigerian, Sub-Saharan, Computational, Fluid, Dynamics, Modelling, Simulation*

ABSTRACT-ONLY PUBLICATION

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

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