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OPTIMAL DESIGN OF SEWER NETWORKS USING LION OPTIMIZATION ALGORITHM

Communication Info

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Abstract

Rapid urban and industrial growth has intensified the demand for efficient wastewater infrastructures. Since pipe procurement and deep trenching represent the primary financial burden in sewerage projects—often exceeding 80% of total investment [1] —optimizing network design is a critical economic priority [2]. Unlike pressurized water distribution, sewer design must strictly balance pipe diameters with excavation depths to maintain gravity flow and prevent sedimentation [3]. The optimization problem is formulated through an objective function targeting global cost minimization:

$$F_{obj} = \sum_{i=1}^{N_{pipes}} (C_{p,i}.L_i + C_{e,i}) + P$$

Where F_{obj} is the total construction cost, N_{pipes} is the number of conduits, $C_{p,i}$ and $C_{e,i}$ represent pipe and excavation costs, and P is a penalty for solutions violating hydraulic constraints [4]. This study develops an optimization tool utilizing the Lion Optimization [5] Algorithm to identify the most cost-effective engineering solutions

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