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Assessment of different MOEAs for rehabilitation evaluation of urban stormwater drainage systems – Case Study: Eastern Catchment of Tehran

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Abstract:

Design/rehabilitation of urban stormwater drainage systems has become a challenging issue due to increasing frequency and severity of floods in urbanized areas. Optimization frameworks can provide a proficient computational tool for stormwater management. In this study, using four different optimization algorithms and EPA-SWMM (Environmental Protection Agency- StormWater Management Model) software, a coupled numerical and optimization model was developed to rehabilitate the drainage system in eastern Tehran, Iran. The current drainage network suffers from a significant lack of hydraulic capacity. Thus, combinations of relief tunnels and/or storage units were evaluated and optimal rehabilitation strategies were suggested according to minimizing conflicting objective functions of costs and flooding. Results have revealed that AMALGAM (A Multi-ALgorithm, Genetically Adaptive Multi-objective) outperformed three other algorithms, NSGA-II (Non-dominated Sorting Genetic Algorithm-II), NSHS (Non-dominated Sorting Harmony Search), and NSDE (Non-dominated Sorting Differential Evolution) for the evaluation of rehabilitation of Urban Stormwater Drainage Systems (USDSs) in terms of convergence and diversity criteria.

Key Words: Urban Stormwater Drainage Systems, Optimization, AMALGAM, Hypervolume, Tehran.