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Optimization Model for Management of Water Quality in a Tidal River Using Upstream Releases

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ABSTRACT

This study deals with the management of water quality in a tidal river through optimal releases of water from an upstream environmental reservoir. A management model is proposed based on the simulation-optimization framework, in which a complete hydrodynamic model for transport of BOD and DO in a tidal river is linked to Simulated Annealing (SA) algorithm for optimization. The proposed management model is used to investigate the effect of tidal variation on the constant minimum in stream discharge that is required to maintain the water quality, for a given pollutant loading. It is demonstrated how the total upstream release volume can be minimized, while still maintaining the desired water quality, by resorting to an optimum temporal variation in releases from the upstream environmental reservoir. The performance of the methodology is evaluated for an illustrative river. The proposed model will be helpful in arriving at best water release policy for maintaining water quality in tidal rivers for given tidal variation and pollutant loading.

KEYWORDS

Water Quality Modeling; Tidal Flow; Simulated Annealing

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