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过程系统工程

具有中间水道的废水再生循环水网络的优化

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摘要

考虑废水再生循环的水网络，可以最大限度地减少系统的新鲜水消耗和废水排放量，具有中间水道的水网络结构，可以有效地提高系统的柔性，本文建立了具有中间水道的废水再生循环水网络的超结构，提出了网络优化的数学模型。由于该最优网络涉及多参数的优化，本文采用了分步优化的策略，根据各参数的相对重要性，依次对新鲜水消耗量、再生水流率和再生负荷进行优化。计算实例表明，本文建立的方法是有效的。

关键词

水网络 中间水道 再生循环 超结构 数学规划 优化

分类号

Optimization of regeneration recycling water networks with internal water mains

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Abstract

A water network with regeneration recycling can reduce freshwater consumption and wastewater discharge to the maximum extent.Networks with internal water mains are normally more flexible, and more convenient to operate and control.In this paper, a general methodology for the design of optimal regeneration recycling water networks with internal water mains was proposed, based on a newly established superstructure.The optimization was virtually a multi-objective problem.Considering the relative importance of these objectives, sequential optimization was adopted.Freshwater consumption, regenerated water flowrate and contaminant regeneration load, were minimized in sequence, which corresponded to three mathematical models.By solving these models step by step, a regeneration recycling water network could be constructed, which was economically favorable.A case study showed the effectiveness of the method.

Key words

water network internal water main regeneration recycling superstructure mathematical programming optimization

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