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过程系统工程

基于混合逻辑动态法的污水处理除氮过程的优化控制

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摘要 应用混合逻辑动态系统法（MLD），对活性污泥1号模型（ASM1）进行了简化，利用有关活性污泥法的专家经验，建立了连续进水间歇曝气活性污泥法除氮动态模型. 再采用预测控制的方法对该过程进行优化控制，通过仿真结果可知：将MLD法应用到活性污泥法建模和优化控制中，可以更加深入地挖掘相关的专家经验知识，并将这些专家经验知识和连续变量模型相结合，使模型更加精确，控制和优化的效果更好. 为污水处理领域研究提供了一条新的途径.

关键词 混杂系统 混合逻辑动态系统法（MLD） 活性污泥法（ASP） 预测控制 混合整数二次规划（MIQP）

分类号

OPTIMAL CONTROL OF NITROGEN REMOVAL IN SEWAGE TREATMENT BASED ON MIXED LOGICAL DYNAMIC METHOD

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Abstract

In this paper optimization of nitrogen removal in sewage treatment is accomplished by using the mixed logical dynamic method(MLD).By simplifying activated sludge process No.1 model (ASM1), nitrogen removal dynamic models in continuously mixed, continuously fed activated sludge process (ASP) are established by expert experience about activated sludge process. Then predictive control approach is applied to optimal control of this process. The simulation results show that it can cover the relative expert experiences more widely by applying MLD to modeling and control of activated sludge process. Such expert experience combined with continuous variable model makes the model more precise and achieves better optimization and control. This study provides a new approach to the research of sewage treatment.

Key words hybrid systems mixed logical dynamic systems activated sludge process predictive control mixed-integer quadratic programming

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