A global approach to estimate continuous-time LPV models for wastewater treatment via nitrification

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Résumé

In wastewater treatment, understanding and modeling the nitrification process is crucial for effective
control implementation. However, the complexity of this process makes it challenging to create

simplified models. This study introduces an innovative method for estimating linear parameter varying

(LPV) models in the context of biological nitrification processes. The research focuses on

the development of a continuous-time LPV model that replicates the behavior observed in the nitrification system.

The methodology adopts the reinitialized partial moment approach within a global identification framework. The

resultant LPV model is structured to capture the dynamics of the biological nitrification process,

considering various factors like flow rates, feed concentrations and environmental regulations.

Application of this approach to measured data from a wastewater treatment plant, demonstrates

its effectiveness in accurately estimating the LPV model parameters. The results not only offer

valuable insights into the dynamics and the nonlinear behaviour of the nitrification process

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but also contribute to the design and optimization of wastewater treatment plants, particularly

those employing submerged aerated nitrifying biofilters.

Keywords: Biofiltration, global approach estimation, LPV models, nitrification, output-error

algorithm, reinitialized partial moment, wastewater treatment