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## AN EFFICIENT ACTIVATED SLUDGE MODEL FOR OPERATOR SUPPORT IN PAPER MILL WASTEWATER TREATMENT PLANTS

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### Abstract

In paper processes, the variability of effluent composition and flow is impossible to predict and generally depends on the type of production method used and the manufacturing breakdowns suffered. Wastewater treatment plant operators find it difficult to maintain the efficiency of biological treatment processes. This paper focuses on activated sludge treatment modelling of paper mill wastewater to provide operators with additional support. Based on both standard activated sludge models (ASM) and those specific to pulp and paper, a number of relevant modifications are put forward so as to easily identify model parameters and obtain a validated model from the dynamic data available. Model validation is performed at a pilot plant fed with industrial effluent. Dynamic steps are applied to the process inputs (flow rates and concentrations), which induces dynamic behaviour in the biological reactor. Measurement uncertainties are taken into account in both the identification and validation steps, while the confidence ranges for the parameters identified are estimated. Significant biological activity is indicated by the high values obtained for the parameters identified, which is confirmed by model validation. Because the size of the pilot plant is sufficient to reproduce realistic hydrodynamics, the validated model accurately describes a treatment plant's behaviour and can be used by operators as a decision-support tool.

*Key words:* activated sludge, model reduction, paper mill effluent, parameter identification

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