Sensitivity study of reduced models of the activated sludge process, for the purposes of parameter estimation and process optimisation: Benchmark process with ASM1 and UCT reduced biological models

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Abstract

The problem of derivation and calculation of sensitivity functions for all parameters of the mass balance reduced model of the COST benchmark activated sludge plant is formulated and solved. The sensitivity functions, equations and augmented sensitivity state space models are derived for the cases of ASM1 and UCT reduced biological models. Matlab software for sensitivity function calculation and sensitivity model simulation is developed. The results are described and discussed. The behaviour of the sensitivity functions is used to determine which parameters of the reduced model need to be estimated in order to fit the reduced model behaviour to the real data for the process behaviour.

Keywords: wastewater treatment, activated sludge process, reduced model, model parameters, sensitivity function, Matlab simulation