

Abstract

This paper deals with the linearization of the full activated sludge model No 1 (ASM1) in the scope of interaction analysis. For consistency, the linearization procedure is developed and validated within the BSM1 simulation benchmark framework. It is based on reaction rate approximation by linear combinations of states. The linear rate models are identified and incorporated in the mass balance equations, yielding a linear locally equivalent to the ASM1 model. Linear models for anoxic and aerated compartments are proposed. It is observed that the presented models track very closely the nonlinear ASM1 responses to various influent data. The key feature of this linearization strategy is that the gotten linear version of the ASM1 model is linear time invariant (LTI) and that it conserves the states biological interpretation and the original ASM1 dimension. It allows, therefore, application of interaction analysis methods and makes it possible to determine motivated control configurations for the ASM1 model. © 2010 Springer-Verlag