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A benchmark simulation model to describe plant-wide phosphorus transformations in WWTPs - DTU Orbit (08/11/2017)

A benchmark simulation model to describe plant-wide phosphorus transformations in WWTPs

It is more than 10 years since the publication of the BSM1 technical report (Copp, 2002). The main objective of BSM1 was to create a platform for benchmarking C and N removal strategies in activated sludge systems. The initial platform evolved into BSM1_LT and BSM2, which allowed for the evaluation of monitoring and plant-wide control strategies, respectively. In addition, researchers working within the IWA Task Group on Benchmarking of Control Strategies for Wastewater Treatment Plants developed other BSM related spin-off products, such as the dynamic influent generator, sensor/actuators/fault models and the different implementations of the ADM1, which have been widely used as stand-alone applications in both industry and academia. The fact that the BSM platforms (or related material) have resulted in 500+ publications demonstrates (Gernaey et al., 2014) the interest for the tools within the scientific community. In this paper, a highly necessary extension of the BSM2 is proposed. This extension aims at facilitating simultaneous C, N and P removal process development and performance evaluation at a plant-wide level. The main motivation of the work is that numerous wastewater treatment plants (WWTPs) pursue biological/chemical phosphorus removal. However, realistic descriptions of combined C, N and P removal, adds a major, but unavoidable degree of complexity in wastewater treatment process models. This paper identifies and discusses important issues that need to be addressed to upgrade the BSM2 to BSM2-P, for example: 1) new/upgraded mathematical models; 2) model integration; 3) new influent characterization; 4) new plant layout; and, 5) new/extended evaluation criteria. The paper covers and analyses all these aspects at a reasonable level of detail, identifies the main bottlenecks that need to be addressed and presents the simulation results of the first software prototype.

General information

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