Comparison of Cascade Control Strategies for Improving the Performance of Wastewater Treatment Processes

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A cascade control strategy is proposed to the benchmark simulation model 1 (BSM1) to enhance the treatment performance of nitrogen removal in a biological wastewater treatment plant. The proposed control approach consists of two control loops, a primary outer loop and a secondary inner loop. The method has two controllers of which the primary loop has a model predictive control (MPC) controller and the secondary loop has a proportional-integral-derivative (PID) controller, that is a cascade MPC-PID controller. There are three influent disturbances and each is meant to be representative of a different weather condition: dry weather, storm weather and rain weather. For each weather condition, the improved control performance is located with the help of the control performance assessment (CPA) technique using a cascade PID-PID controller as a reference.
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