Cascade Control design for Total Phosphorus Removal using Chemical Dosage in a Wastewater Treatment Plant Process

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A new cascade control structure using a systematic tuning rule was proposed to enhance the treatment performance of phosphorous removal in a biological wastewater treatment process (WWTP). The cascade control approach consists of two control loops: a primary outer loop and a secondary inner loop. The primary loop controls the effluent phosphorus and the secondary loop controls the nitrate concentration in the anoxic reactor using the external carbon dosage. Both the loops contains two proportional-integral (PI) controllers. In order to tune each controller, two simple relay feedback identification methods were used. The control objective is to control the phosphorous concentration in the effluent and nitrate concentration in the anoxic reactor, which can remove the effects of disturbances, existed in the WWTP while maintaining better effluent quality.

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