

MULTIVARIABLE PID CONTROL TUNING BASED ON OPTIMIZATION
TECHNIQUE FOR WASTEWATER TREATMENT PLANT

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ABSTRACT

Control designs of wastewater treatment plants (WWTP) become significant nowadays. This is due to the changes in parameters and influent characteristics. WWTP involve a multivariable process which is highly complex and tuning of the control is not easy. In this work, proportional-integral-derivatives (PID) controllers is used. Through a proper tuning of PID controller will result in better closed loop performance of the system. The PID tuning parameters used in this work have been obtained by optimization technique. Two types of optimization method used; particle swarm optimization (PSO) and genetic algorithm (GA) techniques. The tuning parameters have been obtained and the multivariable PID control has been applied to WWTP. The simulation results show better improvement in closed loop performance.

ABSTRAK

Reka bentuk kawalan loji rawatan air menjadi penting pada masa kini. Ini adalah disebabkan oleh perubahan dalam parameter dan ciri-ciri aliran sungai. Loji rawatan air melibatkan proses pembolehubah yang sangat kompleks dan penalaan kawalan tidak mudah. Dalam kerja ini, *proportional-integral-derivatives* (PID) pengawal digunakan. Melalui penalaan yang betul pengawal PID akan mengakibatkan prestasi gelung tertutup sistem lebih baik. Parameter penalaan PID yang digunakan dalam kerja-kerja ini telah diperolehi oleh teknik pengoptimuman. Dua jenis kaedah pengoptimuman digunakan; *particle swarm optimization* (PSO) dan teknik *genetic algorithm* (GA). Parameter penalaan telah diperolehi dan kawalan PID pembolehubah telah digunakan untuk loji rawatan air Keputusan simulasi menunjukkan peningkatan yang lebih baik dalam prestasi gelung tertutup.