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Optimal Tracking Control of a Hydroelectric Power Plant Incorporating Neural Forecasting for Uncertain Input Disturbances

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Abstract : In this paper, we propose an optimal control strategy for a hydroelectric power plant subject to input disturbances like meteorological phenomena. The engineering characteristics of the system are described by a nonlinear model. The random availability of renewable sources is predicted by a high-order neural network trained with an extended Kalman filter, whereas the power generation is regulated by the optimal control law. The main advantage of the system is the stabilization of the amount of power generated in the plant. A control supervisor maintains stability and availability in hydropower reservoirs water levels for power generation. The proposed approach demonstrated a good performance to stabilize the reservoir level and the power generation along their desired trajectories in the presence of disturbances.

Keywords : hydropower, high order neural network, Kalman filter, optimal control
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