

Model Predictive Control of Condensate Recycle Process in a Cogeneration Power Station : I. Controller Design and Numerical Application

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Development of a model predictive control (MPC) system and its application to the condensate recycle process of a cogeneration power station has been conducted. Unlike other industrial processes where MPC has been dominantly applied, operation mode of the cogeneration power station changes continuously with weather and seasonal conditions. Such a characteristic makes it difficult to find the process model for controller design through identification. To overcome the difficulty, a first-law process model was set up by applying the Kirchhoff's law to the pipeline network around the concerned process. The model was tuned to represent the real process data with reasonable accuracy. Finally a linear process model for MPC design was derived. The MPC algorithm has been developed so that the controller tuning is easy with one tuning knob for each output and the constrained optimization is solved by an interior-point method. The developed MPC algorithm has been verified with the numerical process under various disturbance scenarios and mode changes.