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STATISTICAL IDENTIFICATION AND OPTIMAL CONTROL OF THERMAL POWER PLANTS

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Abstract. Statistical system identification and its use for the optimal control of thermal power plants are discussed. The analysis of the plant dynamics and derivation of the state-space representation are performed by fitting a multivariate AR model to the plant data obtained by an experiment. The basic concept of the power plant control and the motivation that necessitated the statistical approach are explained in the introduction. Practical procedure for the implementation of the method is described in detail with examples obtained from actual plants. The main items discussed are the selection of system variables by means of relative power contribution analysis, determination of the state equation and adjustment of the optimal feedback gain by digital simulation technique. Finally, excellent performance of the proposed control system is demonstrated by the operating records of 500 MW and 600 MW supercritical plants.

Key words and phrases: Statistical method, AR model, system identification, thermal power plant, supercritical boiler, multivariable system, nonlinear system, steam temperature control, digital simulation.