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# AN INDIRECT SELF-TUNING CONTROL SCHEME BASED ON RECURSIVE LEAST SQUARES ESTIMATION AND POLE PLACEMENT DESIGN

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**Abstract**

Process control has become increasingly important in the process industries as a consequence of global competition, rapidly changing economic conditions and more stringent environmental and safety regulations. The severity of the non-linearities in chemical and biochemical processes influences the selection of control algorithms for successful control of a process. An adaptive system is one that can modify its parameters or behavior in response to the changes in the dynamics of the process and the character of the disturbances. By increasing our understanding of these systems it may be possible to derive considerable benefit, in terms of reduced product variability and optimal resource utilization, and this work is a step in that direction.

The concept of Self-Tuning Regulators (STR) is introduced. A nonlinear bioreactor is used to illustrate the theory and utility of the said control philosophy. The paper aims at development of an indirect self-tuning approach based on recursive least square (RLS) estimation and minimum degree pole placement (MDPP) design. The process performance is investigated for the designed control strategy. The substantial advantage of adaptive control over the conventional PI Control, in meeting a particular performance criterion is demonstrated in the presence of all the complexities associated with the real process. The simulation is tested in MATLAB – SIMULINK environment. The conception of control presented in this paper will be of assistance in the adjustment of existing controller applications and in the design of new installations.