Comparative study and Analysis of control design on industrial boiler with different control techniques.

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Certificate of authorship/originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of the requirements for a degree except as fully acknowledged with in text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and in the preparation of the thesis itself has been acknowledge. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

Today, power Industry is facing challenges in maintaining their processes economical and emissions low. Need arise in this regard is to reconsider the operational philosophies of industries so that, industrial processes can be operated at new optimum levels where associated costs like operating, maintenance and outages can be minimized and maximum efficiencies can be achieved over running life of the plant. To achieve these objectives, expectations from control system increases much more than the conventional roles. It should be smart enough to monitor equipment deterioration, monitor process inefficiencies and reliability and respond to various time dependant equipment abnormalities like, aging, wear and tear and possibly equipment failures. Since widely used control scheme in industry is still conventional PID scheme, that is why, in this study, conventional PID control scheme is compared with state feedback controller, optimal linear quadratic regulator (LQR) and fuzzy model reference learning control (FMRLC) schemes. A non linear, multivariable, multiple input multiple output (MIMO) model of boiler from a power plant is used as a test bed with fuel flow, combustion air flow and feedwater flow as inputs. While steam pressure, excess oxygen, drum level and steam flow rate (boiler load) as outputs. The steam flow is the only output which is calculated as a function of fuel input and steam pressure. Since significant work has already been done to introduce load disturbances in the steam flow rate, hence disturbances in steam flow are not incorporated in this study. Finally, based on the simulated results, suitable control technique is suggested to operate the real world industrial boiler.