

TITLE: COMPARISON OF RULE-BASED TUNING FOR PI CONTROLLERS

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2024

AUTHOR'S DECLARATION

"I hereby declare that this report is the resof my own work except for quotations and summaries which have been duly acknowledged."

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ABSTRACT

Proportional-Integral (PI) controller widely used in the industrial process control. It is because due to their simplicity and effectiveness in regulating the system response. However, it depends heavily on proper tuning of its parameter. This study compares various rule-based tuning methods such as Ziegler-Nichols, Cohen-Coon, and Takahashi tuning method to evaluate impact on settling time, overshoot, and system stability. The methodologies then applied to a PI control system, and the simulations conducted to monitor the effectiveness.

Result will indicate that Ziegler-Nichol's tuning provide fast response but can cause high overshoot and oscillation making it less inn precision application. Cohen-Coon in other way demonstrated more balanced response, reducing overshoot and improves in stability. This method significantly be used in a system which have significant dead time. Lastly, Takahashi, a less commonly used, showed promising response in minimising settling time while maintaining the stability in the system.

This study showcases the strengths and weaknesses of different tuning methods, highlighting the need to choose the right approach based on the system's behaviour and performance goals. In the future, exploring advanced techniques like adaptive control and machine learning could help make PI controllers even more efficient and precise.

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