

The importance of the modeling method in optimal PID tuning

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Abstract: This work focuses on the interaction between process modeling and PID controller tuning for some of the most popular tuning methods, namely λ -tuning, SIMC and AMIGO. These formula methods are compared to a computer based tool for optimal PID design with robustness constraints. All four methods are used on a first order time delayed model derived using step response tests on a large batch of processes common in process industry. Advantages and disadvantages of the λ -method will be discussed in comparison to the AMIGO tuning method which is the method that best keeps robustness as well as performance out of the four tuning methods. Both the computer based tool and the SIMC method are shown to need better models to provide reasonable robustness for the processes. The model accuracy needed for the optimization tool will be discussed and the result will be compared with the AMIGO method to show when one can expect a computer optimization tool to be the preferred choice for providing the best possible PID controllers.

Keywords: PID control, Model approximation, Optimal control, Robust control, Computer aided control system design
