Experimental Implementation of the Mp-GM (Maximum peak – Gain Margin) Tuning Method

A Tuning Method for 2DOF-IMC under uncertainty process

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Abstract— **Internal Model Control (IMC) yields very good performance for set point tracking, but gives sluggish response for disturbance rejection problem. A two-degree-of-freedom IMC (2DOF-IMC) has been developed to overcome the weakness. However, the setting of parameter becomes a complicated matter if there is an uncertainty model. The present study implements a new tuning method for the controller. The proposed tuning method consists of three steps: Firstly, determine the worst case of the model uncertainty. Secondly, specify the parameter of set point controller using maximum peak (Mp) criteria. And finally, obtain the parameter of the disturbance rejection controller using gain margin (GM) criteria. The method is denoted as Mp-GM tuning method. The effectiveness of Mp-GM tuning method has evaluated and compared with IMCTUNE as bench mark. In the present study, evaluation and comparison have been done through the experimental test rig of the air heater system. Although, the air heater process has two regions that are very different characteristic, the Mp-GM tuning method are able to obtain the good controller parameter even under process uncertainties.**

Keywords-Tuning 2DOF-IMC; Mp-GM Tuning; IMCTUNE; Model Uncertainty