Controller Tuning by means of Multiobjective Optimization Algorithms: a Global Tuning Framework

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Resumen

A novel multiobjective optimization (MOO) approach for controller tuning is presented. MOO algorithms search for a good quality description of the Pareto front $\mathbf{\Theta_P}$ where each solution is Pareto-optimal, since no solution is better than others for all the objectives. This approach to controller tuning gives control engineers greater flexibility to select a controller that matches their specifications. Furthermore, for a given controller it is simple to analyse the trade-off achieved between conflicting objectives, such as performance, control effort, and robustness. By using the multiobjective approach it is also possible to perform a global comparison between different control strategies in a simple and robust way. This approach thereby enables an analysis to be made of whether a preference for a certain control technique is justified. This proposal is evaluated and validated in a non-linear MIMO system using two control strategies: a classical PID control scheme and a feedback state controller. **Keywords:** multiobjective optimization, controller tuning, pid tuning, evolutionary algorithm, decision making.

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