Design and analysis of mixed optimal incremental PID-GIPC controller in flying vehicle control system

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In this paper, a new version of constraint predictive PID controller is proposed. Because of problems for tuning of PID controller in non-minimum phase and high order systems, this method is mixed by predictive control method.

- Generalized incremental predictive controller (GIPC) has ability to be used in non-minimum phase and unstable high order systems. The GIPC algorithm is more robust than the standard GPC method. Furthermore, the constrained GIPC controller algorithm using the quadratic programming removes instabilities caused by actuator saturation. Implementation of GIPC is too difficult and to overcome the limitations of the GIPC and PID, PID-GIPC method is proposed. Computational burden of predictive PID controller is less than GIPC controller. This paper is based on the idea of the constraint PID controller signal matching with constraint GIPC control signal. In this paper Predictive PID controller is implemented for pitch control system of a flying vehicle. It is demonstrated that proposed constraint Predictive PID controller is more robust than standard PID controller in presence of uncertainty and has better performance. The results of this method with other control methods such as PID & GIPC is compared.

Ключевые слова: constrained GIPC, GIPC-PID, Incremental predictive controller

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