SELF-TUNING PARTIAL STATE REFERENCE MODEL CONTROLLERS WITH LOOP TRANSFER RECOVERY

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Abstract. This paper presents a familly of partial state reference model controllers derived using the linear quadratic with loop transfer recovery control design within the delta operator formulation. The partial state reference model control is mainly motivated by its tracking performance when the plant model is unknown as shown in M'Saad et al (1989, 1990). The linear quadratic with loop transfer recovery control design, originally proposed by Doyle and Stein (1979, 1981), is particularly considered for its intrinsic stability robustness against plant model mismatch (See for instance the overview paper of Tadjine et al. (1992) and reference list therein). The loop transfer recovery will be considered at both the plant input and output points to show that the duality is possible for discrete time control. The self-tuning feature is used to provide a suitable control plant model in the adaptive control spirit (Bitmead et al. (1990), Tay and Moore (1991)). More specifically, the system identification refinement and control robustness enhancement aspects investigated in Zang et al. (1991) will be used to improve the performance of the self-tuning controllers under consideration. The delta operator formulation allows to treat the discrete as well as the continuous time systems in a unified framework, while ensuring an appropriate numerical robustness (Middleton and Goodwin (1990)). The effectivness of the proposed self-tuning controllers will be evaluated in a realistic simulation framework.

Key words. Self-tunig control, Delta Operator, Linear Quadratic Control, Loop Transfer Recovery, Performance improvement.

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