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Preview control for discrete-time periodic LPV systems based on LFR

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Abstract

In this study, we present a novel L_2 norm-based preview tracking controller design for discrete-time periodic linear parameter-varying (LPV) systems based on a linear fractional representation (LFR). It also proposes a robust controller design method using actions that are integral and preview to achieve excellent tracking performance and output constraints assuming that the reference signal may be previewe. First of all, an augmented error system (AES) with future knowledge about related signals was performed for a linear periodic system using LFR, transforming a control issue with the preview leading to a stability issue. The proposed conditions depend on using slack variables and decision matrices related to LFR to generate novel preview control. Second, Lyapunov functions dependent on parameters and full-block multipliers were addressed to achieve synthesis situations that are less conservative for discrete-time periodic LPV/LFR systems, which were expressed as linear matrix inequalities (LMIs) to produce reliable output and condition feedback with preview actions. In the end, the efficiency of the proposed control methods was demonstrated based on two numerical cases.

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