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Passivity based state synchronization of homogeneous discrete-time multi-agent systems via static protocol in the presence of input delay

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Abstract

This paper studies state synchronization of homogeneous discrete-time multi-agent systems (MAS) with partial-state coupling (i.e., agents are coupled through part of their states) via static protocol in the presence of input delay. Both uniform input delay and nonuniform input delay are considered. We identify one class of agents for which a static linear protocol can be designed, which is named squared-down passifiable via input feedforward. We derive an upper bound for the input delay tolerance, which explicitly depends on the agent dynamics. Moreover, for any unknown delay satisfying this upper bound, a parameterized static protocol is proposed for each agent such that state synchronization is achieved among agents with uniform or nonuniform input delay.

Keywords: Multi-agent systems, discrete-time, squared-down passifiability via input feedforward agents, input delay, static protocol

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