Tracking Control of Networked Multi-Agent Systems Under New Characterizations of Impulses and Its Applications in Robotic Systems

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Abstract:
This paper examines the problem of tracking control of networked multi-agent systems with multiple delays and impulsive effects, whose results are applied to mechanical robotic systems. Four kinds of impulsive effects are taken into account: 1) both the strengths of impulsive effects and the number of nodes injected with impulses are time dependent; 2) the strengths of impulsive effects occur according to certain probabilities and the number of nodes under impulsive control is time varying; 3) the strengths of impulses are time varying, whereas the number of nodes with impulses takes place according to certain probabilities; 4) both the strengths of impulses and the number of nodes with impulsive control occur according to certain probabilities. By utilizing the comparison principle, criteria are established for these different cases and a relationship between the frequencies (occurrence probabilities) of impulses and systems' parameters is unveiled. Finally, an example for tracking control of robotic systems is provided to show the effectiveness of the presented results.

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