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State consensus for multi-agent systems with switching topologies and time-varying delays.
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Summary: We investigate state consensus problems for discrete-time multi-agent systems with changing communications topologies and bounded time-varying communication delays. The analysis in this paper is based on the properties of non-negative matrices. We first extend the model of networks of dynamic agents to the case with multiple time-delays and prove that if the communication topology, time-delays, and weighting factors are time-invariant, then the necessary and sufficient condition that the multi-agent system solves a consensus problem is that the communication topology, represented by a directed graph, has spanning trees. Then we allow for dynamically changing communication topologies and bounded time-varying communication delays, and present some sufficient conditions for state consensus of system. Finally, as a special case of our model, the problem of asynchronous information exchange is also discussed.

MSC:

- [94A14](#) Modulation and demodulation in information and communication theory
- [93C05](#) Linear systems in control theory
- [93C25](#) Control/observation systems in abstract spaces

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Full Text: [DOI](#)

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