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Consensus conditions of continuous-time multi-agent systems with time-delays and measurement noises. (English) [Zbl 1406.93046](#)

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Summary: This work is concerned with stochastic consensus conditions of multi-agent systems with both time-delays and measurement noises. For the case of additive noises, we develop some necessary conditions and sufficient conditions for stochastic weak consensus by estimating the differential resolvent function for delay equations. By the martingale convergence theorem, we obtain necessary conditions and sufficient conditions for stochastic strong consensus. For the case of multiplicative noises, we consider two kinds of time-delays, appeared in the measurement term and the noise term, respectively. We first show that stochastic weak consensus with the exponential convergence rate implies stochastic strong consensus. Then by constructing degenerate Lyapunov functional, we find sufficient consensus conditions and show that stochastic consensus can be achieved by carefully choosing the control gain according to the noise intensities and the time-delay in the measurement term.

MSC:

[93A14](#) Decentralized systems

[68T42](#) Agent technology and artificial intelligence

[93E03](#) Stochastic systems in control theory (general)

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[multi-agent system](#); [time-delay](#); [measurement noise](#); [mean square consensus](#); [almost sure consensus](#)

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