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The Impact of Competing Time Delays in Stochastic Coordination Problems[1] G. KORNISS, D. HUNT, B.K. SZYMANSKI, RPI — Coordinating, distributing, and balancing resources in coupled systems is a complex task as these operations are very sensitive to time delays. Delays are present in most real communication and information systems, including info-social and neuro-biological networks, and can be attributed to both non-zero transmission times between different units of the system and to non-zero times it takes to process the information and execute the desired action at the individual units. Here, we investigate the importance and impact of these two types of delays in a simple coordination (synchronization) problem in a noisy environment. We establish the scaling theory for the phase boundary of synchronization and for the steady-state fluctuations in the synchronizable regime[2]. Further, we provide the asymptotic behavior near the boundary of the synchronizable regime. Our results also imply the potential for optimization and trade-offs in stochastic synchronization and coordination problems with time delays.

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[2]D. Hunt, G. Korniss, B.K. Szymanski, e-print arXiv:1011.2957 (2010).

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