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Authors' reply to comments on "Distributed event-triggered control of multi-agent systems with combinational measurements"☆

We would like to thank the authors of Sun, Huang, Anderson, and Duan (2017) for their helpful comments and we agree that the scenario mentioned by them may indeed happen for some initial conditions. After checking the proof of Lemma 4 in Fan, Feng, Wang, and Song (2013), we found that the problem lies in the following lower bound for the inter-event time (Eq. (16) in Fan et al. (2013)),

$$\tau_k^i = \frac{\beta_i \|q_i(t_k^i)\|}{2\zeta_i(1+\beta_i)\sqrt{V(t_k^i)}}. \tag{1}$$

It follows from the Zeno definition that there must exist a finite time instant t^* such that $\lim_{k\to\infty} t_k^i < t^*$ if Zeno behavior happens. Thus in this case as k increases, the time length between t_k^i and t_{k+1}^i should decrease to 0 at a certain rate. Therefore, to prove there is no Zeno behavior, one may prove that there exists a strictly positive time length between any two consecutive event time instances, i.e., $t_{k+1}^i - t_k^i > \tau$ for some strictly positive τ and for any k. (This is sufficient to show non-Zenoness but not necessary).

The problem in the proof is that τ_k^i may not be "strictly" positive, although it is positive for any finite k. This is because $\|q_i(t_k^i)\|$ in (1) is decreasing to 0 as the agent group goes to consensus. If $t_{k+1}^i - t_k^i$ is only positive for any k but not "strictly" positive, $\sum_{k=0}^{\infty}(t_{k+1}^i - t_k^i)$ may be finite (i.e., $\lim_{k\to\infty} t_k^i$ is finite). Then Zeno behavior may happen for agent i.

Other parts of the paper, including Lemmas 1, 2, 3 in Fan et al. (2013), are still valid, and the Theorem 1 and Theorem 2 should be revised accordingly by removing the statement on Zeno behavior.

References

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