
Distributed Observer Design for Vehicle Platoon Estimation

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Résumé

This paper presents a distributed high-gain observer for vehicle platoons, where each observer ensures exponential convergence of full state estimation using local measurements and a strongly connected directed communication graph. Unlike previous studies, our approach incorporates the nonlinear longitudinal dynamics of the platoon, taking air resistance into account. By employing the Lipschitz condition and leveraging the structure of the nonlinearity, we derive a less conservative inequality for the nonlinear estimation error. Gain matrices are computed by solving linear matrix inequalities based on observability decomposition. Simulation results for a platoon validate the effectiveness of the proposed observer, showing improved convergence rates and estimation accuracy.

Mots-Clés: vehicle platoon, distributed observer, high, gain observer, nonlinear system

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