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Robust consensus for linear multi-agent systems with mixed uncertainties.

Summary: This paper studies the robust consensus problem for a class of linear Multi-Agent Systems (MASs) with polytopic uncertainties and external disturbances. The uncertainties appear in both the dynamics of each agent and the topology of the overall network. Based on Lyapunov stability theory, the robust consensus problem is converted to the robust $H_{\infty}$ stabilization of the error system. With the aid of Homogeneous Parameter-Dependent (HPD) Lyapunov functions and Sum Of Squares (SOS) technique, the robust consensus problem is further formulated as an SOS programming. Sufficient conditions to achieve robust consensus with disturbance rejection capability are presented in terms of SOS constraints. As an extension, the robust consensus problem for discrete-time MASs is studied in a similar way. Numerical examples are provided to illustrate the effectiveness of the approach.

Keywords: multi-agent system (MAS); homogeneous parameter-dependent linear matrix inequality (HPD-LMI); robust consensus; directed graph
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