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Distributed non-fragile filtering in sensor networks with energy constraints

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Abstract

This paper investigates the distributed filtering problem for sensor networks with energy constraint and filter gain variation. Firstly, two strategies are proposed to reduce energy consumption, i.e., the measurement size and the transmission rate reduction strategies. To reduce the measurement size, a useful measurement selection policy is introduced to choose which element of local measurements is transmitted. The selected measurement, which has a smaller size than the original one is then stochastically transmitted. In order to reflect the imprecision in filter implementation, the additive filter gain variation problem is considered. Based on the switched system approach and some stochastic system analysis methods, a sufficient condition is obtained such that the filtering error system is exponentially stable in the mean-square sense and a prescribed H_{∞} performance level is also guaranteed. Filter gains are shown to be determined by solving a set of linear matrix inequalities (LMIs). Finally, a simulation example is given to demonstrate the effectiveness of the proposed design.

Index Terms

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