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論　文　内　容　要　旨

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学位論文題目	Synthesis of Decentralized Variable Gain Robust Controllers for Uncertain Large-Scale Interconnected Systems （不確かさを含む大規模複合システムに対する分散可変ゲインロバストコントローラの構成法）		

内容要旨

In this thesis, LMI-based design methods for decentralized variable gain robust controllers for uncertain large-scale interconnected systems are proposed. Furthermore, simple illustrative examples are included to show the effectiveness of the proposed decentralized variable gain robust control strategies.

Firstly, in chapter 2, an LMI-based design method of a decentralized variable gain robust regulator for a class of uncertain large-scale interconnected systems is presented. For the uncertain large-scale interconnected system, uncertainties and interactions satisfy so-called matching condition. Furthermore, a sufficient condition for the existence of proposed decentralized variable gain robust controller is given in terms of LMIs. The proposed decentralized variable gain robust controller achieves not only robust stability but also satisfactory transient behavior. Note that LMIs in the case of conventional decentralized fixed gain controllers may not feasible for large-scale interconnected systems with matched uncertainties. On the other hand, the proposed LMI condition is always feasible, namely, designers can derive the decentralized variable gain robust controller provided that some assumptions are satisfied.

Next, based on the result of chapter 2, a design method of decentralized variable gain robust controllers with guaranteed disturbance attenuation performance referred to as "L2 gain performance" for a class of uncertain large-scale interconnected systems is proposed in chapter 3. The proposed decentralized robust controller achieves not only internal stability but also L2 gain performance. The decentralized variable gain robust controller design method derived in chapter 3 is a natural extension of the result of chapter 2.

In chapter 4, a decentralized variable gain robust controller for a class of large-scale interconnected systems with mismatched uncertainties is shown. For the uncertain large-scale interconnected systems, uncertainties and interactions do not satisfy matching condition. There is a possibility that the proposed decentralized variable gain robust controller can stabilize the large-scale interconnected systems with mismatched uncertainties, in the case that the conventional fixed gain controller cannot be designed. The effect of matched parts of uncertainties can be suppressed by the variable gain parameter in the proposed controller, and the size of LMIs which should be solved to design proposed variable gain robust controller is smaller than one for the conventional fixed gain robust controllers. Therefore, the proposed design method can be applied more larger class of uncertain large-scale interconnected systems, and the proposed decentralized robust control scheme is very useful.

Finally, the result, the usefulness of the proposed controllers in this thesis and future works to be carried out are summarized in chapter 5.