SOME STUDIES ON DECENTRALISED CONTROL OF INTERCONNECTED POWER SYSTEMS

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CERTIFICATE

This is to certify that the thesis entitled,'Some studies on Decentralised Control of Interconnected Power Systems' being submitted by Shaligram Agrawala for the award of Doctor of Philosophy to the Indian Institute of Technology, Delhi is a record of bonafide research work he has carried out under our guidance and supervision. The results obtained in this thesis have not been submitted to any other university or institute for award of a degree or diploma.

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ABSTRACT

The present thesis considers the problem of control of large systems and develops some new algorithms for design of decentralised controllers. Single-machine connected to an infinite bus, single-machine connected to a dynamic equivalent and interconnected multimachine power systems have been considered. The main objective has been to develop computationally simpler algorithms that can yield easily implementable controllers. For this purpose the choice of controllers has been of apriori fixed structures whose parameters have been obtained using a numerical optimisation (direct search) technique. In order to avoid complexities of modern control methods such as linear quadratic optimisation and modal control, a direct design criteria of response matching (tracking) has been used. The design method is split into two phases:

i) the offline phase for choosing the initial controller settings and,

ii) the online phase for continuous updating.

The online phase does not require a mathematical model of the system. In case of multimachine power systems a sequential design procedure has been proposed for decentralised control. The methods have been illustrated through simulation studies. For the purpose of comparison, design results have also been obtained using an earlier method known as the model following method. The superiority of the method proposed in this thesis

over the model following method has been shown through simulation studies.

Besides controller design a numerical method for identification of dynamic equivalents for large power systems has also been presented. A salient feature of this method is that it employes the same numerical optimisation technique as has been used for controller design. For the sake of completeness proper background material, reviews and suggestions for further work in this area have been included.

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