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Author: Akanksha Mishra G.V. Nagesh Kumar

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Congestion Management of Deregulated Power Systems by Optimal Setting of Interline Power Flow Controller using Gravitational Search Algorithm

List of Authors and their affiliations
1. Akanksha Mishra
Department of Electrical and Electronics Engineering,
GITAM Institute of Technology,
GITAM University, Visakhapatnam – 530045
2. G.V.Nagesh Kumar
Professor, Department of Electrical and Electronics Engineering,
GITAM Institute of Technology,
GITAM University, Visakhapatnam – 530045

Corresponding Author: drgvnk@rediffmail.com<mailto:drgvnk@rediffmail.com>

Abstract: In a deregulated electricity market it may at times become difficult to dispatch all the required power that is scheduled to flow due to congestion in transmission lines. An Interline Power Flow Controller (IPFC) can be used to reduce the system loss and power flow in the heavily loaded line, improve stability and loadability of the system. This paper proposes a Disparity Line Utilization Factor for the optimal placement and Gravitational Search Algorithm based optimal tuning of IPFC to control the congestion in transmission lines. DLUF ranks the transmission lines in terms of relative line congestion. The IPFC is accordingly placed in the most congested and the least congested line connected to the same bus. Optimal Sizing of IPFC is carried using Gravitational Search Algorithm. A multi-objective function has been chosen for tuning the parameters of the IPFC. The proposed method is implemented on an IEEE-30 bus test system. Graphical representations have been included in the paper showing reduction in LUF of the transmission lines after the placement of an IPFC. A reduction in active power and reactive power loss of the system by about 6% is observed after an optimally tuned IPFC has been included in the power system. The effectiveness of the proposed tuning method has also been shown in the paper through the reduction in the values of the objective functions.

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