Convergence Analysis of the Incremental Cost Consensus Algorithm Under Different Communication Network Topologies in a Smart Grid

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In a smart grid, effective distributed control algorithms could be embedded in distributed controllers to properly allocate electrical power among connected buses autonomously. By selecting the incremental cost of each generation unit as the consensus variable, the incremental cost consensus (ICC) algorithm is able to solve the conventional centralized economic dispatch problem in a

distributed manner. The mathematical formulation of the algorithm has been presented in this paper. The results of several case studies have also been presented to show that the difference between network topologies will influence the convergence rate of the ICC algorithm.

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