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Patent Search

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Abstract:

Abstract The present invention relates to a simplified decoupler designed for integration with Internal Model Control (IMC)-based fractional Automatic Generation Co systems, specifically for two-region interconnected power systems. In modern power systems, the control of frequency in multiple regions is a complex task, largely interdependence of power flows and frequency deviations between interconnected regions. Traditional AGC systems face challenges in maintaining independent control in each region's frequency while ensuring the stability of the overall system. This is further complicated by the interactions between regions, where a change in one region's frequency can affect the other. The proposed invention introduces a simplified decoupler that acts as an interface between the two-region power system and the IMC fractional AGC controllers. The IMC-based controllers independently manage the frequency deviations in each region, providing corrective signals to mitigate these deviations. The role of the decoupler is to ensure that the control actions for one region do not interfere with or destabilize the other region, effectively decoupling the control dynamics between two regions. This novel decoupler reduces the complexity of traditional decoupling mechanisms while maintaining high performance in terms of frequency stabilization and power sharing. By simplifying the control architecture, the invention enhances the overall robustness and stability of the AGC system, minimizing the computational burden typically associated with fractional-order control strategies. Additionally, the invention provides an efficient solution for maintaining coordinated control in interconnected systems, improving both dynamic response and operational reliability.

Complete Specification

Field of the Invention

The present invention relates to control strategies for power systems, specifically to the design and implementation of a simplified decoupler for the internal model control (IMC) based fractional automatic generation control (AGC) of two-region power systems. A two area non-reheated interconnected thermal power system is considered for decentralised controller design. The coupling among areas are the main hurdle encountered in the design of controller. Hence, the idea of simplified decoupling technique is introduced to decouple the two area power system into two equivalent independent SISO systems. Integer and non-integer internal model control (IMC), are independently designed for each area based on decoupled systems. The performance of two area power system equipped with proposed controller is analysed through MATLAB. Simulation results show that proposed controller maintains robust performance and can minimize the load fluctuations. Finally, the method is extended to three area power system.

Objective of Invention

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