

UPFC device application on power system oscillations to improve the damping performance

Abstract

UPFC is considered as an important modern device in the flexible ac transmission systems family that provides the controllability and flexibility for transmission lines. It is also capable of enhancing the stability of the power system by the addition of a supplementary damping controller, which can be installed on any control channel of the UPFC inputs to implement the task of power oscillation damping controller. This paper presents the application of UPFC to enhance damping of low frequency oscillations by the simultaneous coordinated design between power system stabilizer and different UPFC supplementary damping controller in order to identify the design that provided the most robust damping performance in a single machine infinite bus. The parameters of the damping controller were tuned in the individual and coordinated design by using a chaotic particle swarm optimization algorithm that optimized the given eigenvalue-based objective function. The results analysis reveals that the proposed coordinated designs have high ability in damping Low-frequency oscillations and improve the system damping over their individual control responses. In addition, the coordinated design () provides superior performance in comparison to the all coordinated designs.

Keywords

Chaotic particle swarm optimization; PSS; Simultaneous coordinated design; UPFC-POD controller