ABSTRACT

In the present work different approaches to PID PSS design have been investigated using Generalized Hermite- Biehler theorem first time. Methods of design of different types of PID PSS and their performances are studied. Single machine infinite bus bar system and its extension to multi-machine case are considered by using two stage control theory.

The class of all stabilizing PID Power system stabilizers are designed (i) with torque angle feedback – theoretical premises, and (ii) speed feedback based on Hermite-Biehler theorem. Optimal PSS is to be designed by minimizing a performance index (ISE type) and to compare the time responses with other methods of design. Genetic Algorithm is used to solve the optimization problem.

Mixed H_2/H_∞ PID PSS is designed by minimizing the disturbance sensitivity function. The time responses of the single machine infinite bus bar power system are studied with disturbance at the output. Hence, the disturbance rejection property is verified by sensitivity minimization.

A mixed H_2/H_∞ robust PID PSS is designed by minimizing a sensitivity and a control sensitivity function. The robustness of the system for different operating conditions and parameter variations is investigated.

An optimal PID PSS for an interconnected multi-machine power system is designed based on generalized Hermite-Biehler theorem, and two level control strategy is adopted to find the gain of PID PSS. The optimal controller is designed again by minimizing a ISE performance index taking advantage of the genetic algorithm. A mixed H_2/H_∞ robust PID PSS is designed for multi-machine system by minimizing a sensitivity and a control sensitivity function.