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Mohsen Farahani, Soheil Ganjefar



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Intelligent Power System Stabilizer Design Using Adaptive Fuzzy Sliding Mode Controller

Mohsen Farahani

Sama Technical and Vocational Training College,
Islamic Azad University, Karaj Branch, Karaj, Iran

m.farahani@basu.ac.ir

Soheil Ganjefar

Electrical Engineering Department Department ,
Bu-Ali Sina University, Hamedan, Iran

s_ganjefar@basu.ac.ir

Abstract- This paper proposes an adaptive fuzzy sliding mode controller (AFSMC) with a PI switching surface to damp power system oscillations. To overcome the difficulties in the design of a sliding-mode controller, which are the supposition of known uncertainty bounds and the chattering phenomenon in the control effort, a wavelet neural network (WNN) sliding-mode control system is studied. In the control system of the WNN sliding-mode, a WNN bound observer is developed to adjust the bound of uncertainties in real time. An adaption law is obtained from the Lyapunov stability theory, so the stability of the closed-loop system can be guaranteed. Then, the effectiveness of the AFSMC is studied under different situations of a two-area four-machine power system. The results verify that performance of AFSMC is much better than conventional power system stabilizer (CPSS).

Keywords: Power system stabilizer (PSS), sliding mode controller, adaptive fuzzy controller

1. Introduction

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