

The Effects of Machine Components on Bifurcation and Chaos as Applied to Multimachine System

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The second system of the IEEE second benchmark model of Subsynchronous Resonance (SSR) is considered. The system can be mathematically modeled as a set of first order nonlinear ordinary differential equations with the compensation factor ($\mu = Xc/XL$) as a bifurcation (control) parameter. So, bifurcation theory can be applied to nonlinear dynamical systems, which can be written as $dx/dt=F(x;\mu)$.

The effects of machine components, i.e. damper winding, automatic voltage regulator (AVR), and power system stabilizer (PSS) on SSR in power system are studied. The results show that these components affect the locations, number and type of the Hopf bifurcations.

Keywords: Hopf Bifurcation, Chaos, Subsynchronous Resonance, Damper Windings, PSS.