Analysis of subsynchronous resonance in power systems

Control strategy of unified power flow controller (UPFC) utilizing dq decoupling control is deduced in this paper, which can closely follow the control orders of the active and reactive power. The subsynchronous resonance (SSR) characteristics of a series compensated system equipped with UPFC are studied, and the results reveal that SSR characteristics of the ...

4. 2 Analysis of induction generator effect: frequency scanning method 83 4. 3 Analysis of torsional interaction(TI) 87 4. 4 State equations and eigenvalue analysis 96 4. 5 An algorithm for computing torsional modes 108 4. 6 Countermeasures for SSR III 4. 7 Torsional oscillations in parallel connected turbine generators 120 121 5. INTERACTIONS WITH ...

2.2. System Modeling for Analyzing Subsynchronous Resonance (SSR) Analysis of SSR. SSR is a state in which the power system exchanges the energy with the generator turbine at one or more frequencies below the synchronous one where the synchronous frequency is defined as the one corresponding to the rotor average speed.

A novel supplementary subsynchronous damping controller (SSDC) is proposed for the generator excitation system which is capable of damping out subsynchronous oscillations in power systems with series compensated transmission lines.

Analysis of Subsynchronous Resonance Characteristics and Influence Factors in a Series Compensated Transmission System Chengbing He 1,*, Dakang Sun 2, ... Abstract: Series capacitor compensation is used to improve the utilization of existing power systems. Subsynchronous resonance (SSR) can be caused by series compensated lines, which would ...

How far from the point of disturbance may the SSR effects be detected in a multi-machine power system? 2. The modelling of multi-machine power system dynamics for the analysis of subsynchronous resonanceThe calculation of SSR oscillatory mode frequencies requires that generator turbines and the power system are adequately represented.

power systems [2-3]. 1.1 Introduction to SSR The formal de nition of SSR is provided by IEEE [4] to be, Subsynchronous resonance is an electric power system condition where the electric net-work exchanges energy with a turbine generator at one or more of the natural fre-quencies of the combined system below the synchronous frequency of the system.

4. 2 Analysis of induction generator effect: frequency scanning method 83 4. 3 Analysis of torsional interaction(TI) 87 4. 4 State equations and eigenvalue analysis 96 4. 5 An algorithm for computing torsional modes 108 4. 6 Countermeasures for SSR III 4. 7 Torsional oscillations in parallel connected turbine generators 120 121 5.

Analysis of subsynchronous resonance in power systems

Xiaorong Xie (Fellow, IEEE & IET) is a Professor and Director of the Flexible Transmission & Distribution Systems Research Institute at the Department of Electrical Engineering, Tsinghua University, China.He has been engaged in research on power system stability analysis and control, subsynchronous resonance/oscillation, grid integration of renewable energy, and ...

Analysis of Subsynchronous Resonance in Power Systems is written by K.R. Padiyar and published by Springer. The Digital and eTextbook ISBNs for Analysis of Subsynchronous Resonance in Power Systems are 9781461556336, 1461556333 and the print ISBNs are 9781461375777, 1461375770. Save up to 80% versus print by going digital with VitalSource. ...

The paper presents a novel approach for detection of subsynchronous resonance phenomenon SSR in a series compensated transmission system. The presented method is designed to detect subsynchronous resonance frequency and amplitude in very short time to prevent the failure of transmission systems, which can likely happen if the subsynchronous ...

Many utilities are either applying or considering applying series capacitors because of the economic advantage. But the hazards to turbine-generators require that utility engineers fully understand and thoroughly analyze the effects of subsynchronous resonance (SSR) caused by series capacitors. To help in the understanding and analysis of SSR, the authors ...

dynamic power system problems, namely subsynchronous resonance (SSR). Systems that experience SSR exhibit dynamic oscillations at frequencies below the normal system base frequency (60 Hz in North America). These problems are of great interest in utilities where this phenomenon is a problem, and the computation of conditions that excite

The sub-synchronous oscillations seem to be intermittent and occurring both with and without any apparent disturbance in the WMZ or surrounding region. The magnitude of oscillations, as measured at RCTS 220 kV, is mostly small and usually does not exceed 1% peak-to-peak RMS, although they have been observed up to 2.2%.

Conventionally transmission line power transfer capability can be increased by inserting the series compensation into the transmission lines. Though series compensation is an economical solution compared to building a new transmission line, it brings the risk of Sub-Synchronous Resonance in turbine-generator system-based power plants. In literature mitigation of SSR was actively ...

Analysis of Subsynchronous Resonance in Power Systems (Power Electronics and Power Systems) - Kindle edition by Padiyar, K.R.. Download it once and read it on your Kindle device, PC, phones or tablets. Use features like bookmarks, note taking and highlighting while reading Analysis of Subsynchronous Resonance in Power Systems (Power Electronics and ...

Analysis of subsynchronous resonance in power systems

Three aspects of Subsynchronous Resonance (SSR) related problems in power systems are addressed in this dissertation which aims at contributing to a better understanding of these problems. Subsynchronous Resonance (SSR) problems in series compensated steam-turbine power systems co-exist with the beneficial effects provided by the series capacitors.

Eigenvalue analysis is extensively used in power system subsynchronous resonance (SSR) study. For SSR analysis, dynamic representation of the network is required, whereas both the state variables selection and the state equations formation for the network are difficult to process especially when the system configuration is subjected to variations.

"An analysis of subsynchronous resonance problems requires a clear understanding of the physical relationships that produce the phenomenon." L.A.Kilgore, D.G.Ramey, M.C.Hall Simplified transmission and generation system analysis procedures for subsynchronous resonance problems. IEEE Transactions on Power Apparatus and Systems, Volume: 96 ...

ANALYSIS AND MITIGATING OF SUBSYNCHRONOUS RESONANCE IN POWER SYSTEM INTEGRATED WITH PV POWER STATION The following faculty members have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Science, with a major in Electrical ...

Purely electrical phenomenon Self-excitation of Sub Synchronous Oscillations Generator "acts" as a NEGATIVE resistance at the sub synchronous frequencies. If this effective negative resistance is greater in magnitude compared to the positive resistance as seen from the system, an unstable resonance condition can take place.

This book provides an introduction to subsynchronous resonance in power systems and includes material on system modeling, system parameters, and system analysis. ... selective modal analysis is applied for a power system comprising two identical generators connected to an infinite bus through a series compensated transmission line and ...

Mathematical calculations for subsynchronous system modeling Subsynchronous Resonance in Power Systems provides in-depth guidance toward the parameters, modeling, and analysis of this complex subclass of power systems. Emphasizing field testing to determine the data required, this book facilitates thorough and efficient oscillation and damping modeling ...

The sending end bus voltage is regulated by control of shunt reactive current while the active and reactive power flows in the transmission line are regulated by series injected voltages. This paper reports the analysis and study of Subsynchronous Resonance (SSR) characteristics of hybrid compensated system with GUPFC.

Figure 2. The resonance frequency depends on the degree of line com-pensation and typically ranges be-tween 10 and 45 Hz. If the frequency corresponds to an undamped natural frequency of a generator shaft, the electrical power system may interact with the shaft and cause subsynchronous resonance. This condition can be seen in the