Transient and steady-state stability analysis of SMIB power system embraced with highly penetrated pv generator

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This paper aims to investigate the transient and steady-state stability of Single Machine Infinite Bus (SMIB) power system embraced with highly penetrated Photovoltaic (PV) generator. The complete nonlinear dynamical mathematical model of the system in dq stationary reference frame has been used for numerical simulations including the dynamics of the damper windings and Automatic Voltage Regulator (AVR) of the synchronous generator. The two generators are integrated at a common coupling point which has been shunted by a conventional capacitor. Both generators are interfaced to the grid via two parallel transmission lines. The robustness of this integration is checked out following step changes in the solar irradiance levels. The steady-state stability of the power system is studied via the eigenvalues of the linearized model around the operating point at wide range of solar intensity levels. The response of the system following step changes in the synchronous generator driving power at wide range of practical solar intensities has also been outlined. It has been concluded that integrating the PV generator to the synchronous generator connected to the grid can run steadily at wide range of solar irradiance levels and at wide range of synchronous generator driving torques. Figure 1 shows the configuration of the power system under study.

Biography
Mohammad S Widyan received his BSc degree in Electrical Power Engineering from Yarmouk University, Jordan in 2000 and his MSc degree in Control and Power Engineering from Jordan University of Science and Technology in 2002. From 2002 to 2003, he worked as a Lecturer in Electrical Engineering Department at The Hashemite University, Jordan. He received his PhD degree from Berlin University of Technology, Germany in 2006. Currently, he is an Associate Professor of Electrical Engineering at The Hashemite University. His fields of interest are Power System and Electrical Machine Dynamics, Bifurcation Theory and Control, Permanent-Magnet and Conventional Electrical Machine Design, Finite Element Technique and Renewable Energy Systems. He has published more than 45 papers in international peer-reviewed journals and conferences.

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