

Global Summit on Electronics and Electrical Engineering

November 03-05, 2015 Valencia, Spain

Effect of wind energy participation in AGC of interconnected multi-source power systems

Saab Bader AL-Tamimi
Qassim University, KSA

This paper presents the investigations on the effect of wind energy system's participation on dynamic stability margins available on AGC of interconnected power system. A two area power system model interconnected via EHV-AC tie-line is considered for the study. Each of the areas is consisting of hybrid sources of power generation like; hydro, thermal, gas and wind power plants. Various participation factors for electrical energy received from wind power plants, along with the energy from thermal, gas and hydro plants, are considered for the investigations. Moreover, any reduction of generation from thermal power plant is supposed to be supplied by wind power plant for fuel saving and to reduce emissions to environment. The optimal AGC regulators are designed using full state vector feedback control theory. Following the achievement of optimal gains of AGC regulators, the system closed-loop system eigenvalues are obtained for various case studies. The investigations of the closed loop eigenvalues carried out reveal that all the closed-loop Eigenvalues are lying in the negative half of s-plane for all case studies and thus ensure the closed-loop system stability. Also, closed-loop eigenvalues are found to be sensitive to reduction in thermal generation and subsequent increase in electrical energy from wind power plants. It is also observed that the computed complex Eigenvalues have shown a considerable decrease in the magnitude of its imaginary part when reduction of thermal generation is met by wind power generation. The reduced magnitudes of imaginary parts of closed-loop eigenvalues result in cost effective controller realization and improvement in system stability. On the other hand, the replacing the deficit caused in the supply with wind energy has no undesirable emissions to environment.

Biography

Saab Bader AL-Tamimi is pursuing Master's degree in Electrical Engineering at the University of Qassim, Saudi Arabia. After that, he completed Bachelor's in Electrical Engineering from Hail University, Saudi Arabia. He worked on many researches during undergraduation and especially on power and automatic generation control.

saab_tam@hotmail.com

Notes: