

Variable wind power output introduces new challenges to power system frequency regulation and control, such as automatic generation control (AGC) which is very important to regulate power system frequency. The existing methods to design control gains for proportional-integral (PI) controllers in AGC are either time consuming or easily affected by the designer's experience. Further, the control gains are usually designed with fixed values for specific scenarios in the studied power system. The desired response may not be achieved when variable wind power is integrated into power systems. To address these challenges, a dynamic gain tuning control (DGTC) method for AGC is proposed in this paper. By the proposed control method, PI control gains can be dynamically adjusted to reach the desired performance. The proposed method is tested in a modified IEEE 39 bus system with actual wind data, and compared with conventional control approach with well-tuned fixed gains in the simulation. The simulation results show that the proposed control method provides better AGC response with less deviation of system frequency and tie-line flow under variable wind power.