

ABSTRACT

Grid-compliant wind-turbine systems require compensation of reactive power into the grid to maintain voltages and increase power system stability under variable load levels. To provide a solution a conventional PM synchronous generator of a slip synchronous wind generator system is upgraded to a hybrid-PM synchronous generator (hybrid-PMSG) by introducing slots in the rotor that are wound with field coils. In this way the flux in the generator and reactive power can be controlled by rotor-field MMF control. In addition, it is possible to operate the wind generator as synchronous condenser under zero-wind conditions so that it will act as a source of lagging and leading VARs to the grid. In this paper the effects of the rotor field winding MMF of the proposed hybrid-PMSG and its performance as a source of dynamic VARs (both capacitive and inductive) of a grid compliant slip synchronous wind-turbine system are described.