

《Grid forming with inverter based generation for unconventional state power system restoration》

In recent years, power grid accidents occurred in Venezuela, Iran and other power grids beyond the scope of power grid failure in the conventional sense, with the characteristics of targeted destruction of key facilities. In the unconventional state, the failure risk of the key black-start power supply such as pumped storage and gas unit is high as the emergency equipment, and the system recovery task is difficult to be undertaken without power supply. It is the strategic need to seek the alternative black start power supply and its recovery control method to ensure the security of China's power grid. Firstly, according to the requirements of black start, in the transient time scale, aiming at the coordination and cooperation between the fast dynamic of inverter interface power supply and the slow dynamic of conventional units, a virtual synchronous generator grid forming technology adapted to the black start scenario is proposed. Secondly, in the medium and long time scale of system recovery, a robust distributed recovery decision method of prediction - control - dispatch coordination is established according to the characteristics of output fluctuation and distribution dispersion of inverter interface power supply. Finally, according to the needs of the transition from abnormal to normal power grid, the state identification, state assessment and state switching methods of abnormal recovery are studied to realize the evolution simulation and state assessment of abnormal recovery of power grid. It is expected to provide new theoretical support for the construction of diversified black-start power supply and flexible recovery means for power grid.