

Dynamic Response Characteristics of Distribution Network including Distributed Generators and Power System Stability

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According to the deregulation in the electric power industry, the distributed generators (DGs: wind power, solar cell system, micro gas-turbine system, fuel cell system and so on) are introduced to the load system side in recent years, and the configurations of the electric power system, especially the load system has been complicated.

Various problems arise, for example, reverse power flow, increase of harmonic components of currents and voltages, islanded operation and so on. The quality and reliability of power supply may become poor, such as the voltage fluctuation, frequency change in the present system. Voltage regulation and stability problems in the load system become more important items to clear in power system operations.

The energy storage devices with highly controllable active and reactive powers will play an important role in the distribution network including several kinds of intermittent power generating devices. It is important to make clear the necessary capacity and the functions of the storage device.

Recently, not only the distributed generators but also the active controllable loads are introduced into the distribution networks more and more, the dynamic response characteristics of the bulk system will become complex feature, and will affect the power system stability.

It is useful for the power system operators to know the operating conditions of the distribution networks. New technology to evaluate the bulk load system operating conditions is needed.