
Protection improvement against power direction changes in synchronous generator connected to the electrical power system by digital reverse power relay

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Synchronous generators are one of the most important and valuable devices at power plants and in the electrical power system. Generator's internal and external faults, not only can harm the very generator, but also can end up in the loss of a considerable amount of plant's energy. Normal operation can be disrupted if damages to the generator aggravate and spread due to lack of proper protecting systems which should have separated the generator the rest of network. In such conditions repairing the faulted parts may take too long and in the mean time other generators must carry the burden of compensating electrical power shortage. These problems might cause damage to synchronous generators and reduce their lifetime. The only way to prevent dealing with such problems is to detect and control internal and external defects before they expand. One of the most important protecting devices for synchronous generators, when input mechanical power cut occurs, is reverse power relay which preserves generator motoring operation and cuts the reverse flow of electrical power towards the machine. In this study, protection improvement against power direction changes for synchronous generator, with respect to the main goals and constraints of problem will be discussed. The main objective of present research is to achieve digital reverse power relays designing parameters improvement, by which generator protecting system against motoring state upgrades. At the beginning a typical synchronous motor will be introduced, and after defining the operation of protecting relays, fundamentals and designing basics, simulation process of reverse power relay block on Matlab/Simulink® will be accomplished. Afterwards the role of digitalizing the process of designing and

manufacturing mentioned equipments, to protect synchronous generators is discussed. Finally protection efficiency of proposed model against input mechanical power changes is analyzed using different scenarios.

Keywords : protection, power direction changes, reverses power relays

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