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Thu-Mo-Po4.11-01 [74]: Analysis on Protection Coordination of Over-Current Relay Using SFCL's Impedance Compensation for Protection of a Power Distribution System

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Recently, the magnitude of the fault current in the grid has been increased due to the development of the electric power industry and the increase of the distributed power generations. Since the increase of the fault current may cause a bigger accident than the capacity of the existing installed protective equipment, it is necessary to replace the protective device with a larger capacity or reduce the magnitude of the fault current. However, replacing protective devices requires astronomical costs, so a superconducting fault current limiter(SFCL) that has been studied as an effective way to limit fault currents should be used. The SFCL has a characteristic that limits the fault current in 1/4 cycle without causing loss in the system because the impedance is normally zero. However, when the SFCL is installed in the power distribution system, the fault current is lowered, which causes the trip delay of the installed over-current relay. Also, when the distributed power source is introduced, the magnitude of the fault current increases or decreases depending on the location of the distributed power generation and the fault location, and reverse current may occur depending on the situation. This is a problem not only in the introduction of the distributed generations of the radial system but also in the loop system.

In this paper, the SFCL's impedance factor is used to solve the trip delay of the over-current relay. In order to compensate the problem, the SFCL's impedance factor is used because the trip delay method uses the previously studied SFCL's voltage factor and the correction constant must be changed according to the fault location. The bus line current and the voltage of the SFCL are used to reflect the SFCL's impedance factor, and they are all measured, so there is no need to install additional measuring instruments. Therefore, an over-current relay using SFCL's impedance factor with these advantages was simulated and analyzed by PSCAD EMTDC.

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