RELEVANCE OF THE METHOD OF ACCELERATED COORDINATION OF RELAYS TO ENSURE THE RAPIDITY OF RELAY PROTECTION

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Abstract. The necessity of application of mathematical method of accelerated relay coordination to achieve the goals of increasing the reliability and speed of modern power systems is discussed.

Keywords: power system, electric power industry, relay protection, relay coordination, protection reliability, speed performance.

The reliability and continuity of a power system depend directly on a well-tuned relay protection (RP), which is subject to serious requirements. In the event of a mains failure or malfunction, the protection circuitry must eliminate it with minimum losses by immediately isolating the damaged part from the faulty part to ensure the required continuity of supply. For greater stability, in addition to the main relay protection, its backup type is used. In the power system, a fault causes the main relay to activate immediately, and if it fails, the standby relay responds [3, p. 186]. By virtue of its operating principle the relay also switches off a considerable part of the normally functioning system, thus minimizing power continuity and increasing power loss. Then, due to heating, the energy dissipation increases, leading to equipment failure. All this turns out to be economically undesirable. In addition, it is important to note that a significant number of relay trips are caused not by true network faults, but by faulty relay settings [4, p. 58]. Thus, there is a need for a reliable, correct, and efficient relay coordination scheme with an accelerated computation process and performance that could be considered optimal [5, p. 90419].

Since many power systems contain two-way and ring power flow topologies, a technically and economically suitable protection scheme should consist of overcurrent directional relays (ODRs). The design of the ODR protection depends on the time setting assignment (TSA) and the pin setting assignment (PSA). The protection engineer is able to coordinate the relays in the same time as the main relay fault is eliminated if the directional and directional sounders are properly set. It is

important that the directional sounders and sounders of each relay be in clear agreement with the other standby relays, but the fact that all relays have different settings, the process of coordinating them is not an easy task [6, p. 161]. The fact that each two relays have two parameters (directional sounders and sounders) leads to an increase in the number of variables to be included in the problem [1, p. 94]. Therefore, in systems with a large number of relays and constraints, the complexity of their coordination is intensive and requires a special method of accelerated relay coordination [2, p. 7].

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