

Sarayut Bureekaew 2012: Application of Negative-sequence Overcurrent Elements for Improved Protection of PEA 22-33 kV Distribution System. Master of Engineering (Electrical Engineering), Major Field: Electrical Engineering, Department of Electrical Engineering. Thesis Advisor: Associate Professor Santi Asawasripongtorn, M.Eng.Sc. 205 pages.

This thesis presents a study of applying the detection of negative-sequence fault current to the protection system. This approach is different from the original PEA's protection system in which the pick up current does not depend on the load current. The study was conducted for the case of low faults current. By using DIgSILENT PowerFactory 14.0, three different type of faults, were simulated, i.e., single line to ground fault, phase to phase fault, and phase to phase to ground fault. Due to the negative-sequence fault is zero, a three-phase fault was not considered. The conditions for generating these 3 faults were; (1) the ground resistance of single line to ground and phase to phase to ground faults was set to 40 Ohms, (2) arc resistance, short circuit power and fault location were varied. The study showed that fault's types, arc resistance, ground resistance, MVA short circuit and fault location resulted in low fault current which affected functionality of the main and back up protection system. The detection of negative-sequence fault current technique can be used to reduce working duration of the back up protection and increase speed of fault detection as well as increase the reliability of the protection system for the cases of phase to phase and phase to phase to ground faults.

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