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МАТЕРІАЛИ ВСЕУКРАЇНСЬКОЇ НАУКОВОЇ КОНФЕРЕНЦІЇ ВИКЛАДАЧІВ, АСПІРАНТІВ, СПІВРОБІТНИКІВ ТА СТУДЕНТІВ

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MODELING OF DISTANCE POWER PROTECTION IN SOFTWARE COMPLEX PSCAD / EMTDC

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Modelling of protective relays offer an economical and feasible alternative to investigate the performance of relays and protection systems. To study the performance of the relay characteristics, single line to ground fault at different zones with and without fault resistances are considered. A Fast Fourier Transform block in PSCAD/EMTDC has been used to extract the fundamental component. The test network used in this work is 230kv transmission line systems.

Transmission lines electrically connect different elements in a power system. Electrical power that is generated at relatively low voltage levels is raised to a higher voltage level to be transported on transmission lines for supplying energy to loads. Transmission lines generally use voltages of 115 kV and higher. The level of voltage of transmission lines requires that line conductors be supported on adequate insulation and remain sufficiently clear of the ground to assure proper operation of the system and safety of personnel. Distance protection has been widely used for protecting transmission and transmission circuits because of its suitability, simplicity, economy and reliability.

Distance protection is used in networks of complex configuration, which for reasons of safety and sensitivity cannot be used more simple overcurrent. This article demonstrate detailed distance protection scheme of power lines (Fig. 1).

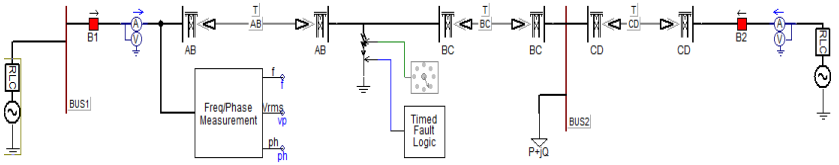

Figure 1. – Simulation setup of Transmission line in PSCAD.

Data are given about comparison of the circular and polygonal protection zone. The algorithm proposed in this paper prevents false

triggered distance protection in a mode of asynchronous course, and swings in power system. It is show that the response time of the distance protection with polygonal protection zone response time is less than the distance protection with a circular protection zone. The simulation of the system is done by using PSCAD/EMTDC software. In Figure 2 are shown typical distance zones that provide local and back-up protection to a transmission system. In this figure, protection zones are specified according to the numerical identification of the associated breakers.

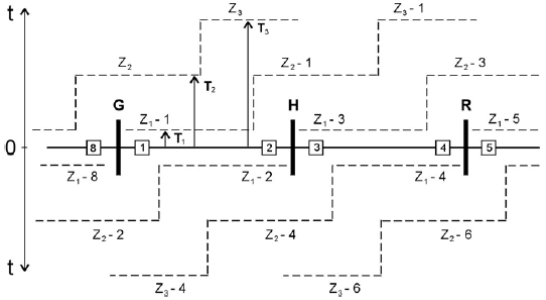

Figure 2. – Distance relay protection zones.

At Figure 1. Setting of the mho relay is
Zone-1 = 53.95 Ω (80 % of protected line AB).
Zone-2 = 101.16 Ω (100 % of protected line AB + 50 % of the protected line BC).
Zone-3 = 151.75 Ω (100 % of protected line AB + 100 % of the protected line BC+25% of the protected line CD).
Conclusions: In this work mho relay characteristics are developed using PSCAD. The performance characteristics of mho relay was evaluated at different locations with single line to ground fault. Main conclusion of this work is as follows.

· The developed mho characteristics may be used for training young and inexperienced engineers and technicians.

· Different case studies have been presented in order to illustrate the response of the developed mho characteristics at different locations, with and without fault resistances.