DOI: https://doi.org/10.15407/techned2018.05 . 084

HIGH SPEED PROTECTION FOR SERIES COMPENSATED PARALLEL LINE

Journal	Tekhnichna elektrodynamika
Publisher	Institute of Electrodynamics National Academy of Science of Ukraine
ISSN	1607-7970 (print), 2218-1903 (online)
Issue	No 5, 2018 (September/October)
Pages	84 – 87

Authors
Piotr Pierz*, **Eugeniusz Rosolowski****, **Jan Izykowski*****
Department of Electrical Power Engineering, Wroclaw University of Science and Technology, Wybrzeze Wyspianskiego 27, 50-370 Wroclaw, Poland,
e-mail: piotr.pierz@pwr.edu.pl, eugeniusz.rosolowski@pwr.edu.pl, jan.izykowski@pwr.edu.pl
* ORCID ID : http://orcid.org/0000-0001-8647-6293
** ORCID ID : http://orcid.org/0000-0002-8656-8531
*** ORCID ID : http://orcid.org/0000-0002-1048-5510

This paper describes a novel idea for fast protection of parallel series-compensated transmission lines operating in various configurations. It is based on the logic diagram of flag signals, which are determined using only one-end phase currents measurements. The developed method has been tested and evaluated using signals obtained from computer simulations. The detailed models of considered transmission line including the SC&MOV banks as well as the measurement channels have been developed. Using these models, the reliable data for fault on a double-circuit series-compensated transmission line, as well as for faults outside the line, have been generated under variety of fault scenarios. The sample test-case results of algorithm operation, as well as statistical evaluation are presented and discussed. Ref erences 10, figures 5, table 1.

Key words: distance line protection, series compensation, fast line protection, double-circuit line, fault detection.

Received: 02.03.2018
Accepted: 19.06.2018
Published: 16.08.2018

References

1. McLaren P.G., Swift G.W., Zhang Z., Dirks E., Jayasinghe R.P., Fernando I. A New Directional Element for Numerical Distance Relays. *IEEE Transactions on Power Delivery*. 1995. Vol. 10. No 2. Pp. 666-675.
DOI:
https://doi.org/10.1109/61.400865
2. Kasztenny B. Distance protection of series compensated lines–problems and solutions. P*roceedings of the 28*
th
Annual Western Protective Relay Conference
, Spokane, WA, USA. October 22–25, 2001. Pp. 1-34.
3. Novosel D., Phadke A., Saha M.M., Lindahl S. Problems and solutions for microprocessor protection of series compensated lines. 6-th International Conference on Developments in Power System Protection. Nottingham, UK. Conf. Publication 1997. No 434. Pp. 18–23.
4. Shah A., Sood V.K., Saad O. MHO relay for protection of series compensated transmission lines. *Proceedings of the International Power System Transients Conference - IPST 2009*. Paper ID: 09IPST090. Kyoto, Japan. June 3-6, 2009.
5. Gagnon C., Grav P. Extensive evaluation of high performance protection relays for the Hydro-Quebec series compensated network. *IEEE Trans. Power Delivery*. 1994. Vol. 9. No 4. Pp. 1799–1811. DOI:

https://doi.org/10.1109/61.329513
6. Apostolopoulos C.A., Korres G.N. A novel fault-location algorithm for double-circuit transmission lines without utilizing line parameters. *IEEE Trans. Power Delivery*. 2011. Vol. 26. Pp. 549-557. DOI: https://doi.org/10.1109/TPWRD.2010.2102777
7. Saha M.M., Smetek G., Izykowski J., Rosolowski E., Pierz P. Location of inter-circuit faults on double-circuit transmission line. *Proceedings of the Modern Electric Power Systems - MEPS '15* . 2015. Wroclaw, Poland. Pp. 1-7. DOI: https://doi.org/10.1109/MEPS.2015.7477199
8. Kasztenny B., Benmouyal G., Altuve H.J., Fischer N. Tutorial on operating characteristics of microprocessor-based multiterminal line current differential relay. *Present Problems of Power System Control.* 2013. No 3. Pp. 5-73.
9. Pierz P., Rosolowski E., Izykowski J., Balcerek P., Saha M.M. A Method for Internal and External Fault Discrimination for Protection of Series Compensated Double-Circuit Line. *Proceedings of the IEEE-PES Power Tech Conference* . June 16-20, 2013. Grenoble. Pp. 1–7. DOI: https://doi.org/10.1109/PTC.2013.6652404
10. Dommel H. Electromagnetic Transients Program. Bonneville Power Administration. Portland, OR. 1986.

PDF