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Signal Processing Technique Based Transmission Line Protection With and Without Penetration of Wind Energy

Publisher: IEEE

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Abstract:

The rapid progression in the field of technology in recent decades resulted in the emergence of renewable energy resources in the power system. This penetration of renewable sources in power grids gives rise to problems like variable and hardly predictable generation capacity. Thus, an effective and reliable protection scheme is essential for this technological advancement. This paper introduces a hybrid combination-based algorithm of three different signal processing techniques - Hilbert Transform (HT), Stockwell Transform (ST), Alienation Coefficient (ACF). Current signals are decomposed by using HT, ST, and ACF for concluding H-factor, S-factor, A-factor respectively. Further, these factors are multiplied by the element-by-element method for the calculation of the Proposed fault factor (PFF). In addition, the ground's role in the case with two-phase faults must be determined. The S-factor is used to calculate the proposed ground fault factor (PGFF). The study is being done for double line fault (LLF), double line to ground fault (LLGF), triple line fault (LLLGF), and triple line to ground fault (LLLGF). The experiment is carried out in a MATLAB/Simulink environment on a two-terminal transmission line with and without penetration of wind energy.

Published in: 2022 International Conference on Intelligent Controller and Computing for Smart Power (ICICCSP)

Date of Conference: 21-23 July 2022

INSPEC Accession Number: 22014060

Date Added to IEEE Xplore: 25 August 2022

DOI: 10.1109/ICICCSP53532.2022.9862327

► ISBN Information:

Publisher: IEEE

Conference Location: Hyderabad, India

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