Distribution Line Parameter Estimation Under Consideration of Measurement Tolerances - DTU Orbit (02/12/2018)

Distribution Line Parameter Estimation Under Consideration of Measurement Tolerances
State estimation and control approaches in electric distribution grids rely on precise electric models that may be inaccurate. This work presents a novel method of estimating distribution line parameters using only root mean square voltage and power measurements under consideration of measurement tolerances, noise, and asynchronous timestamps. A measurement tolerance compensation model and an alternative representation of the power flow equations without voltage phase angles are introduced. The line parameters are obtained using numeric methods. The simulation demonstrates in case of the series conductance that the absolute compensated error is −1.05% and −1.07% for both representations, as opposed to the expected uncompensated error of −79.68%. Identification of a laboratory distribution line using real measurement data grid yields a deviation of 6.75% and 4.00%, respectively, from a calculation based on the manufacturer's cable specifications and estimated line length. The transformed power flow equations deliver similar results despite the reduced problem complexity.

General information
State: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Energy System Management, Department of Informatics and Mathematical Modeling, Risø National Laboratory for Sustainable Energy, Austrian Institute of Technology
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Pages: 726-735
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: IEEE Transactions on Industrial Informatics
Volume: 12
Issue number: 2
ISSN (Print): 1551-3203
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 8.37 SJR 1.599 SNIP 3.183
Web of Science (2017): Impact factor 5.43
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 8.29 SJR 2.114 SNIP 3.418
Web of Science (2016): Impact factor 6.764
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 7.57 SJR 2.381 SNIP 3.242
Web of Science (2015): Impact factor 4.708
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 8.17 SJR 2.151 SNIP 3.883
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 9.38 SJR 1.975 SNIP 4.424
Web of Science (2013): Impact factor 8.785
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 5.56 SJR 0.934 SNIP 3.078
Web of Science (2012): Impact factor 3.381
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 4.08 SJR 0.802 SNIP 2.412