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IEEE Recommended Practice for Electric Power Distribution System Analysis

IEEE Power and Energy Society

Sponsored by the
Power System Analysis, Computing, and Economics Committee

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IEEE Power and Energy Society

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Abstract: The aim of this recommended practice is to expand the use of IEEE power distribution test feeders into a broader space of software developers, software users, and researchers. The need for new distribution software functionality evolves quickly in areas such as distributed resource modeling, load response to voltage and frequency, reliability improvement, neutral-earth voltage, harmonics, active controls, interoperability, etc. By leveraging and expanding the set of test feeders, more attention can focus on providing the new functionality. The scope of the recommended practice includes steady-state, event-based, probabilistic, stochastic, and dynamic analysis of medium-voltage (up to 35 kV) electric utility power distribution systems. Industrial and commercial power distribution systems, harmonic analysis, and electromagnetic transient analysis are all excluded.

Keywords: IEEE 1729™, power distribution, power system analysis

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Introduction

This introduction is not part of IEEE Std 1729™-2014, IEEE Recommended Practice for Electric Power Distribution System Analysis.

In 1991, an IEEE working group paper published the data for four different unbalanced radial distribution test feeders for the purpose of testing load flow algorithms. In 2001, a sequel working group paper added the data for a fifth test feeder that focused on transformer connections. These papers have been cited hundreds of times, indicating the value of using common test feeders in IEEE publications. Data for several new test feeders has been developed since 2001, and that process is ongoing.

This recommended practice aims to expand the use of these IEEE test feeders into a broader space of software developers, software users, and researchers. The need for new distribution software functionality evolves quickly in areas such as distributed resource modeling, load response to voltage and frequency, reliability improvement, neutral-earth voltage, harmonics, active controls, interoperability, etc. By leveraging and expanding the set of test feeders, more attention can focus on providing the new functionality:

a) Researchers and software developers can test their calculation methods with published and accepted data sets.

b) It is not necessary for each developer and researcher to publish custom data sets, which are sometimes incomplete.

c) The set of test feeders helps to establish a baseline of expected software capabilities in being able to solve the test feeders.

d) By creating new test feeders, the horizon of expected software capabilities will expand without imposing the rigidity of a standard specification.

e) The feeder data can be used for schema development and interoperability tests in the IEC Distribution Common Information Model or other modeling protocols.

f) The lack of test feeders in a certain topic may be taken as partial evidence that new work is needed in that area.

The target audience for this recommended practice includes electric power distribution utilities, commercial vendors of engineering analysis software for distribution systems, and academic researchers working in this area.

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