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# Simulated Testing Algorithm for $\mu$ PMU Full Observation of Balanced Radial Distribution Grid

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## Abstract:

Today's electric power distribution systems with development of distributed energy resources introduce variability, uncertainty, and opportunities to recruit diverse resources for grid services. Multiple resources on each feeder have more complex impacts on the circuit behavior that can be observed with voltage and current phase angle variations. Micro Phasor Measurement Units ( $\mu$ PMUs) take timesynchronized measurements of voltage, current and frequency that can tell grid operators what is happening, where, and when. This paper presents a new  $\mu$ PMUs power flow algorithm for complete observation of balanced radial distribution grid. This algorithm calculates all voltages in both high and low voltage buses, currents in all branches, line active and reactive power flow in all branches and total active and reactive power losses in the grid. This algorithm provides high quality data for distribution planners and operators, which will translate into better model accuracy and thus better results from distribution analysis tools. To test the validity of proposed algorithm, backward / forward sweep power flow program is developed and tested by ETAP software.

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