

Comparative Characterization of Parallel Distribution Sensors Under Field Conditions

Project T35

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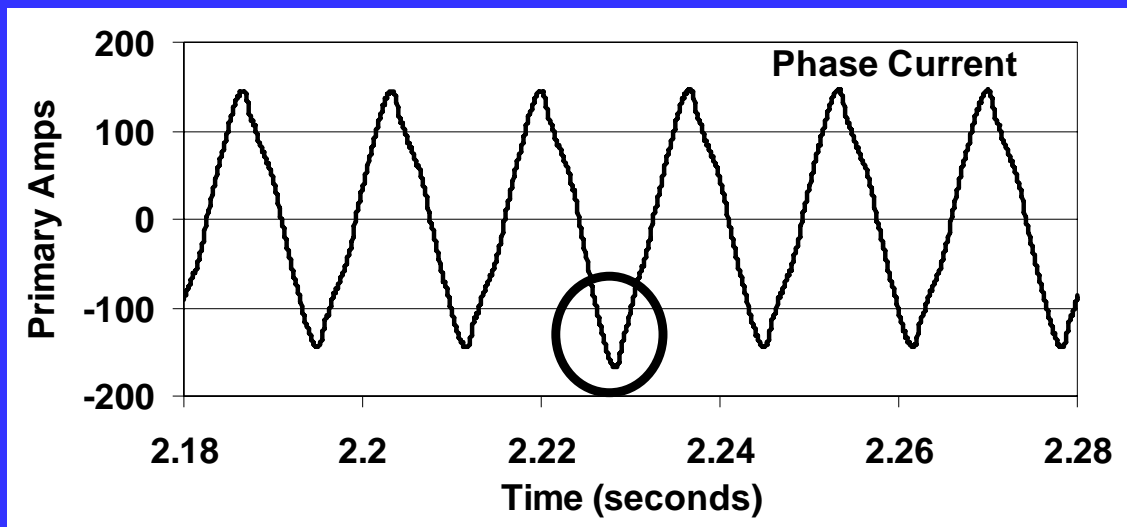
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Comparative Characterization of Parallel Distribution Sensors Under Field Conditions

- Advances in substation and distribution automation have increased the importance of power system sensors.
- Advanced functions such as fault anticipation and power quality require high-fidelity data.

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Example waveform shows a 22-ampere fault precursor. The incipient signature is masked by a large load current with rich harmonic content.

Sensors must represent both load and fault current faithfully in both magnitude and phase, even when dominant load currents may be rich in harmonics.

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- Conventional sensors (CTs, PTs) are the de-facto standard for meter-quality sensing.
- Expense of acquisition and installation is a barrier to adoption of new technologies.

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- Cost of deploying a monitoring system includes not only the system itself, but also all equipment and labor necessary for installation.
- In many cases, the cost of installation can be significantly higher than the cost of the sensor itself.

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- Less expensive sensors are available, but their ability to reproduce signals of interest is unknown.
- This is especially true when the signals of interest are subtle, low-level, and time-varying, and when they are “buried” in normal load.

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- Sensitivity, linearity, frequency response, transient response and other characteristics generally not known.
- Conventional laboratory testing methods do not assess response to such signals.

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Project Objective:

Compare response of non conventional sensors with that of conventional CTs and PTs, to determine the suitability of lower-cost alternatives to support widespread deployment of advanced technologies.

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Key Question:

- Can lower cost sensor solutions provide basic sensing functionality, enabling deployment of applications which were previously cost-prohibitive, and thereby enhancing utilities' ability to operate their systems more effectively?

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Generalized Methodology:

- Form utility advisory committee.
- Researchers and utility advisory committee select candidate sensors for evaluation.
- Utility “champions” provide sensors for installation and evaluation.
- Install multiple types of non conventional sensors in parallel at Southern Company substation in Birmingham.
- Simultaneously capture high-fidelity data from multiple sensor sets during power system events, as they occur naturally over time.
- Retrieve, analyze, and characterize sensor performance as compared to conventional CTs and PTs (de facto standard).
- Prepare report on findings, to include benefits and limitations of various sensors and the relative ease and cost of installation.

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Installation site at Southern Company in Birmingham, Alabama.



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- Selected Sensors



- Piedmont Bushing and Insulator, Inc.; Model LSCV-110-122-23 (V&I)
- Lindsey Manufacturing Company; Model 9650/1404 (V&I)
- S&C Electric Company; Model EA-1472R1 (V&I)



Sensors will be installed 3Q 2008

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