Paper 06: Co-Simulation: Unlocking Advanced Approaches to Electrical Incident Analysis

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Abstract:

Ensuring electrical reliability is key for Oil & Gas facilities, where process continuity and safety are essential. While outages are rare, when they occur, root cause identification is complex due to multiple interacting factors. Immediate restoration takes priority, leaving incomplete data for post-event analysis.

This paper illustrates how combining partial operational records—such as operator logs, alarm histories, and protection relay data—with advanced transient and dynamic simulations enables diagnosis of blackout causes and preventive actions. Through a case study of a generator fed installation, we show how the failure of a single breaker pole led to a full blackout, and how simulation confirmed the fault origin and guided the design of mitigation solution.

In addition to technical insights, the paper presents best practices for integrating available protection relay data into co-simulation setups that combine electrical system modelling with protection algorithms and signal processing.

Customer feedback will be provided, as well as the contribution of this type of analysis to their understanding of incidents.