

PS3 – Q3.01 - What kind of development is expected in protection systems to meet the various challenges posed by the changing power system?

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The Traveling Wave-Based Protection and Related Test System as an Evolution of Power System



CONPROVE



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■ Changes from Power System needs new Solutions

- Ultra-high-speed protection
- More accurate Fault Locations

-> Based on Traveling Waves

- TW Concept
 - Transient (Voltage changes)
 - Propagation both sides
 - Arrival Time Measuring

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■ Advantages

- Time domain based
- Trip time 1ms (Around)
- Impedance 21 -> Phasor Domain
- Trip time more than 8 ms (usually)

■ Increased Speed

- System Stability
- Minimize equipment damage
- Improves Power Quality
- Contribute to overall safety

■-> Can help for IBRs traditional protections problems

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- Traditional test sets are no sufficient
- Necessity of specialized test system
 - Software to model and simulate
 - Frequency dependent Line Models
 - 1 nano second time step
 - D / A working on MHz
 - Injection with Secondary Levels
 - Closed Loop Tests
- > Evaluate the sensitivity of algorithms

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■ Example of a TW Test System in a Brazilian Laboratory

