

## Control techniques for Transmission Lines and Power Grids

### Market need

Today's electrical networks are highly interconnected for the economical sharing of resources. Power generating sites are often far from load centers and power needs to be transmitted through transmission lines. Power transmission system expansion is needed, but not easily accomplished without new technology.

In a large interconnected power system, disturbances can cause machines to oscillate with one another, causing instability. This instability can lead to faults and ultimately damage to the power system.

The scope of relays in an automated power grid is massive as they can help control all communication and distribution between the consumer and the supplier. This forms the key driver for all relay manufacturers around the world.

The global relays market is growing at a CAGR of 7.7% from 2015 to 2021. This market is expected to be valued at US\$16.24 bn by the end of 2021.

### Our solution

Power systems dynamics are modeled by trajectories followed by the system variables. This is much faster than all methods currently available from relay manufacturers and can predict rather than just detect impending out-of-step conditions that can lead to generator faults. These predictions can be built into adaptive controllers that can be directly adjusted to the operating conditions without the need for manual parameter tuning.

### Benefits to our approach

- A simple but powerful technique for detecting power system instability, and even predicting such instability before it occurs.
- Much faster than methods currently available from relay manufacturers. Faster detection and predicting faults before they begin can greatly increase power system robustness and limit downtime and outages.
- As renewables become increasingly prevalent sources in electrical power systems, robust grids and transmission lines need to become more robust and smarter.

### Active Patents/Applications

US Patent US 13/949,629

Canadian Patent CA2783755C

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