DETECTING FAULTS IN POWER SUPERHIGHWAYS

Sahar Pirooz Azad and Dirk Van Hertem

Electricity is often generated hundreds of kilometres from where it's consumed. (Think offshore wind farms and remote hydroelectric dams.) The most efficient and economical way to move electricity over those kinds of distances is through high-voltage direct current (HVDC) transmission lines — so-called "power superhighways."

However, addressing faults like voltage or current spikes and short circuits is far more difficult in an HVDC grid than in a standard AC grid, because they travel so much faster.

WISE researcher Sahar Pirooz Azad is tackling that issue. Together with Belgian collaborator Dirk Van Hertem, Azad has developed a relaying algorithm that can detect an HVDC fault and identify its location in a fraction of a millisecond, making it possible to contain the problem quickly.

Unlike conventional fault detection systems that require communication between the local relay and a centralized decision-making unit, Azad and Van Hertem's algorithm handles everything locally, saving crucial time.

The two researchers have proved their algorithm successfully detects both transmission line faults and faults on the DC buses that form connection points in the grid — and it can discriminate between the two. It can also distinguish between actual faults and other disturbances, so it doesn't trigger unnecessary circuit breaks.

The two researchers conclude their algorithm satisfies the main requirements for any relaying algorithm: selectivity, sensitivity, reliability and speed. And because it uses current sensors rather than costly voltage sensors, the price tag is attractive.

Put it all together, and you've got a powerful way to avoid bumps on the power superhighway.

Researchers: ***Sahar Pirooz Azad*** *and Dirk Van Hertem*

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