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NERC, EPRI Release Open Source Code to Analyze Geomagnetically Induced Currents

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WASHINGTON, DC – In a joint effort, the North American Electric Reliability Corporation (NERC), Department of Energy (DOE) and the Electric Power Research Institute (EPRI) developed a simulation tool for the electric industry to analyze geomagnetically induced currents (GIC) on their systems.

The software, which is an open-source code, was developed as part of NERC's ongoing efforts to identify high-impact, low-frequency risks, such as the impact of geomagnetic disturbances effects on the bulk power system.

"One of the key findings in NERC's geomagnetic disturbance report is the bulk power system planners and operators require more tools to simulate the impacts of GIC on the grid," said Mark Lauby, vice president and director of Reliability Assessments and Performance Analysis at NERC. "This open-source software is a starting point toward equipping the industry with the information needed to ensure continued bulk power system reliability."

The GIC simulation program is capable of performing N-phase modeling, meaning the analysis is not limited to three-phase systems. Additionally, the program's interface allows users to define circuit models, execute the functions of the program and implement algorithms that interact with the simulator. This allows users to dynamically change circuit parameters and modify input, enabling long-term (hours or days) analysis of GMDs.

The GIC program uses earlier research that integrates GMD modeling into power flow analysis and was conducted at the University of Illinois at Urbana-Champaign as part of the DOE-funded Power Systems Engineering Research Center (PSERC) Future Grid Initiative.

"Industry needs to know if and when the bulk power system and equipment are vulnerable to the effects of GMD," said Richard Lordan, senior technical executive at EPRI. "This tool calculates the geomagnetically induced currents used to perform system and equipment analysis."

The GIC simulation portion of the program was added to EPRI's existing Open Source Distribution System Simulator (OpenDSS), which is a comprehensive electric power system simulation tool that supports frequency domain analyses.

The tool has been used for more than a decade in support of various research and consulting projects requiring system analysis. Improvements, such as GIC simulation capability, have advanced the use of the program. The OpenDSS software tool has been designed to be scalable so it can be modified to meet future needs.

Additionally, DOE, EPRI and industry are expanding the GIC monitoring system nationwide to produce additional measurements used to test and improve the accuracy of the tool's models. Further, this network of GIC monitors will fortify industry's ability in forecasting GICs and support operating action to mitigate their effects on the bulk power system.

NERC released the [2012 Special Reliability Assessment: Effects of Geomagnetic Disturbances on the Bulk Power System](#) in February. The report takes a comprehensive look at multiple, complex issues to evaluate GMD effects; outlines the most likely outcomes; and offers short- and long-term recommendations for industry. The GMD report is the second of four ongoing efforts identified in the 2010 [High-Impact, Low-Frequency Event Risk to the North American Bulk Power System](#) report, which also includes the spare equipment database report, which has been released; and two upcoming reports from task forces focused on cyber attack and severe impact resilience.

To download EPRI's OpenDSS, visit <http://sourceforge.net/projects/electricdss/>. A Wiki containing supplementary documentation, the latest information, hints and tricks is available at <http://electricdss.wiki.sourceforge.net/>. For technical support, contact [Roger C. Dugan](#).

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The North American Electric Reliability Corporation's mission is to ensure the reliability of the North American bulk power system. NERC is the electric reliability organization (ERO) certified by the Federal Energy Regulatory Commission in the United States to establish and enforce reliability standards for the bulk-power system. NERC has equivalent relationships with provincial and federal authorities in Canada. NERC develops and enforces reliability standards; assesses adequacy annually via a 10-year forecast, and summer and winter forecasts; monitors the bulk power system; and educates, trains and certifies industry personnel. Learn more at www.nerc.com