Energy Consulting

GE PSLF GMD TOOL*

GMD Analysis Tool focused on meeting NERC requirements

Background

Geomagnetic disturbances (GMDs) caused by solar storms have recently received increased attention from the scientific community. This attention is largely due to the potential damaging impacts that a large disturbance could have on the electric power grid. There are several historical GMD events that have caused electric power grid problem.

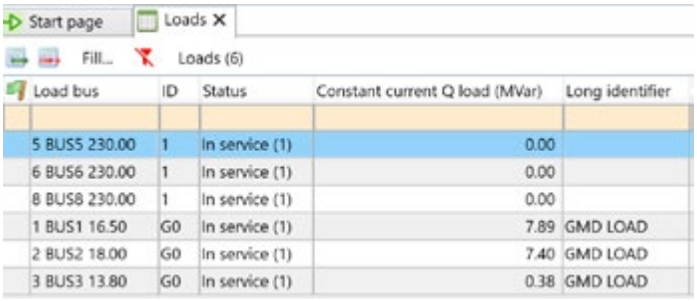
In 1989, a GMD event was identified as the cause of a major blackout in the Hydro-Quebec system. During the event, power system transformers entered half-cycle saturation due to the DC GICs flow and became harmonic current injection sources. The increased level of harmonic current caused protective equipment to trip multiple SVCs in the system. Other cascading outages followed causing roughly 83% of the total generation in the Hydro-Quebec system to trip.

Given the potential threat that GMDs pose to bulk power system reliability, the Federal Energy Regulatory Commission (FERC) issued a NOPR and has directed the North American Reliability Corporation (NERC) to create reliability standards to address the potential impact of GMDs. The standards address the analysis requirements, operational considerations and other mitigation measures.

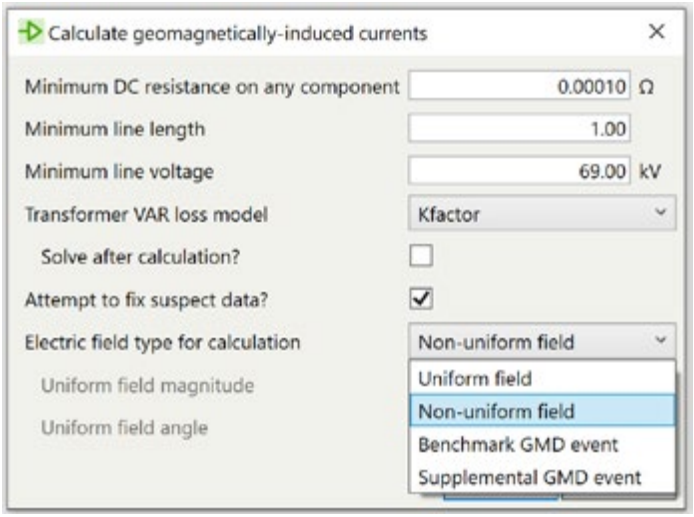
The PSLF GMD Tool is designed to allow existing and new PSLF users to easily analyze the impacts of GMD events on the transmission system and assess potential mitigation measures, and allows engineers to perform the analysis necessary to meet NERC standards.

Benefits of PSLF GMD Tool

- An advanced GMD data estimation function. Starting from your current PSLF power flow data, the "Estimate data" tool enables quick initial analysis of the system without the need to collect the GMD data.
- Simulates both uniform and non-uniform electric fields.
- Calculates GICs for uniform, non-uniform electric fields, and GMD Benchmark and Supplemental events.
- Automated solution process is provided in GIC calculation.
- GIC and power flow calculation can be automated via EPCL for a time series electric field.
- Results are translated into induced currents viewable within the components' tables.
- Transformers' incremental reactive power losses are modeled in the loads table as constant reactive current loads.
- It allows for both linear and non-linear relationships for transformers' incremental reactive power loss calculation.
- The "Screen transformers" tool screens the effective current in transformers with respect to rotation in electric field angle for uniform electric field, and GMD Benchmark and Supplemental events. It reports transformers with an effective current above a user-specified threshold and also provides the worst effective current per transformer and its corresponding electric field angle in a text file.
- Full EPCL and editor support are provided to edit GMD-specific data and to run GMD analysis.



Load bus	ID	Status	Constant current Q load (MVar)	Long identifier
5 BUS5 230.00	1	In service (1)	0.00	
6 BUS6 230.00	1	In service (1)	0.00	
8 BUS8 230.00	1	In service (1)	0.00	
1 BUS1 16.50	G0	In service (1)	7.89	GMD LOAD
2 BUS2 18.00	G0	In service (1)	7.40	GMD LOAD
3 BUS3 13.80	G0	In service (1)	0.38	GMD LOAD



For more information on GE PSLF, please contact pslf.sales@ge.com today.

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