



TEXAS A&M UNIVERSITY

Department of Electrical
& Computer Engineering

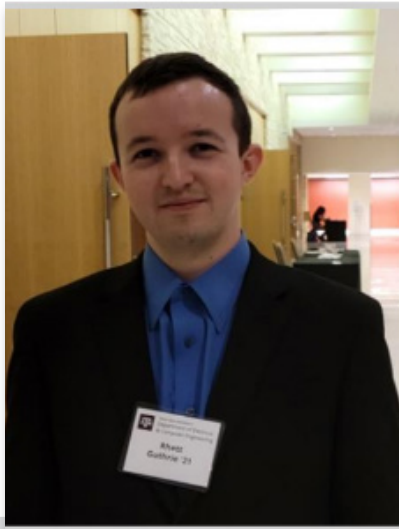
TRANSFORMING ENGINEERING EDUCATION

ENERGY & POWER GROUP SEMINAR

Geomagnetic Disturbances Overview on the Cyber-Physical Electric Grid

Abstract

Geomagnetic Disturbances (GMDs) are a natural phenomenon that can impact the world around. GMDs are caused by coronal mass ejections (CMEs) from the sun, which cause disturbances in the Earth's atmosphere and magnetosphere. These disturbances can result in electric grid issues, and communication problems. The electric grid is mainly affected by geomagnetically induced currents (GICs), which are induced currents traveling through the grid, including transformers, which can be damaged through GICs. GICs additionally, can result in protection devices tripping, adding to grid instability. On top of GICs, there can be communication and radio blackouts through the disturbed ionosphere. Today's society and grid rely on accurate and timely information, which is typically sent through wireless means. However, if there is a radio blackout some information could be lost, reducing operators' options during a critical time. These problems are concerning, but there are some ways to mitigate the impacts from GMDs based on experience. The most notable recent GMDs are from March 1989, October 2003, and May 2024. GMDs are considered a high impact low frequency (HILF) event with how infrequent large-scale storms are. GMDs are a natural phenomenon that the electric grid must be prepared for, to ensure electrical reliability.



Rhett Guthrie

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Electrical & Computer Engineering
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Friday, February 28

11:30 am
241 ZACH

Biography

Rhett received his BS degree in Electrical Engineering double major with Applied Mathematics from Texas A&M University, College Station, Tx in Spring 2021. He is currently pursuing a PhD degree in electrical engineering with the Department of Electrical and Computer Engineering, Texas A&M University, College Station, Tx. Research interests are on modeling of GMD storms, GMD effects on the Power grid, Power Grid Reliability and Resilience in regards to GMD events, Prime number research, Mathematical Number theory on Power System Data, Transmission Line Consequence analysis, and Oscillations in the Power Grid.

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