TEXAS A&M UNIVERSITY
Department of Electrical & Computer Engineering

TRANSFORMING ENGINEERING EDUCATION

ENERGY & POWER SEMINAR

Toward An Integrated Reliability Assessment Framework for Geomagnetic Disturbances

Abstract

Geomagnetic disturbances (GMDs) threaten the grid through geomagnetically induced currents (GICs), which saturate transformers, causing operational effects such as voltage stability issues, potentially leading to load curtailment and, in extreme cases, grid blackout. GMDs pose a severe threat to system reliability, and it is imperative to model the effects of GMDs in the reliability assessment. Hence, this paper proposes an integrated reliability assessment framework wherein the GMD effects are included by adding a GMD reliability module to the generally accepted reliability assessment framework. The paper addresses the first subprocess in the integrated framework - reliability modeling of GMDs. A way to characterize the GMD storms in the context of reliability analysis is shown by introducing three parameters (TTGMD, GMDT, and GMDC) that model the storms' frequency, duration, and intensity. Over 90 years of historical geomagnetic data was processed, and historical observations for TTGMD, GMDT, and GMDC were obtained. An automatic fitter procedure then fits the historical data to probability distributions culminating in the initial steps for developing a GMD-integrated reliability assessment framework.

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Friday, October 6
11:30 am - 12:20 pm
244 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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