1163-05-909 **Upama Nakarmi*** (unakarmi@usf.edu). *Analyzing Critical Components of Power Grids During Cascading Failures Using Community Structures in Interaction Graphs.*

Cascading failures in high-voltage transmission networks of power grids can result in large-scale blackouts that cause massive economic and social disruption. Analyses and mitigation of cascading failures are challenging problems due to the large number of components in power grids and their complex interactions during cascades. In this study, cascading failure data is used to construct interaction graphs, which capture the local as well as the complex at-distance interactions caused due to the physics of electricity. Next, community structures in interaction graphs are studied to show that communities contain pertinent information about the behavior of cascade processes. In general, the likelihood that a cascade entering a community will spread within the same community is higher compared to the likelihood of it spreading to other communities. Hence, communities act as traps for failures during cascades. Furthermore, a community-centrality metric is defined to identify critical components of cascade processes. Various evaluation techniques including data-driven, graph-based, epidemic simulation-based, and power system simulation-based are used to verify the importance of the components and compare with ones identified using traditional centrality metrics. (Received September 14, 2020)