



NERC Lessons Learned

Donnie Bielak
Manager, Reliability Engineering



Interconnection Oscillation Disturbances



Bulk Power System Operations, Generation Facilities



May 4, 2021

- 0.25 Hz oscillation propagated through entire Eastern Interconnection on 1/11/2019 for 18 minutes
- A steam turbine experienced faulty input to a Power Load Imbalance control system caused by a failed potential transformer
- Originally presented at February, 2019 PJM Operating Committee^[1]

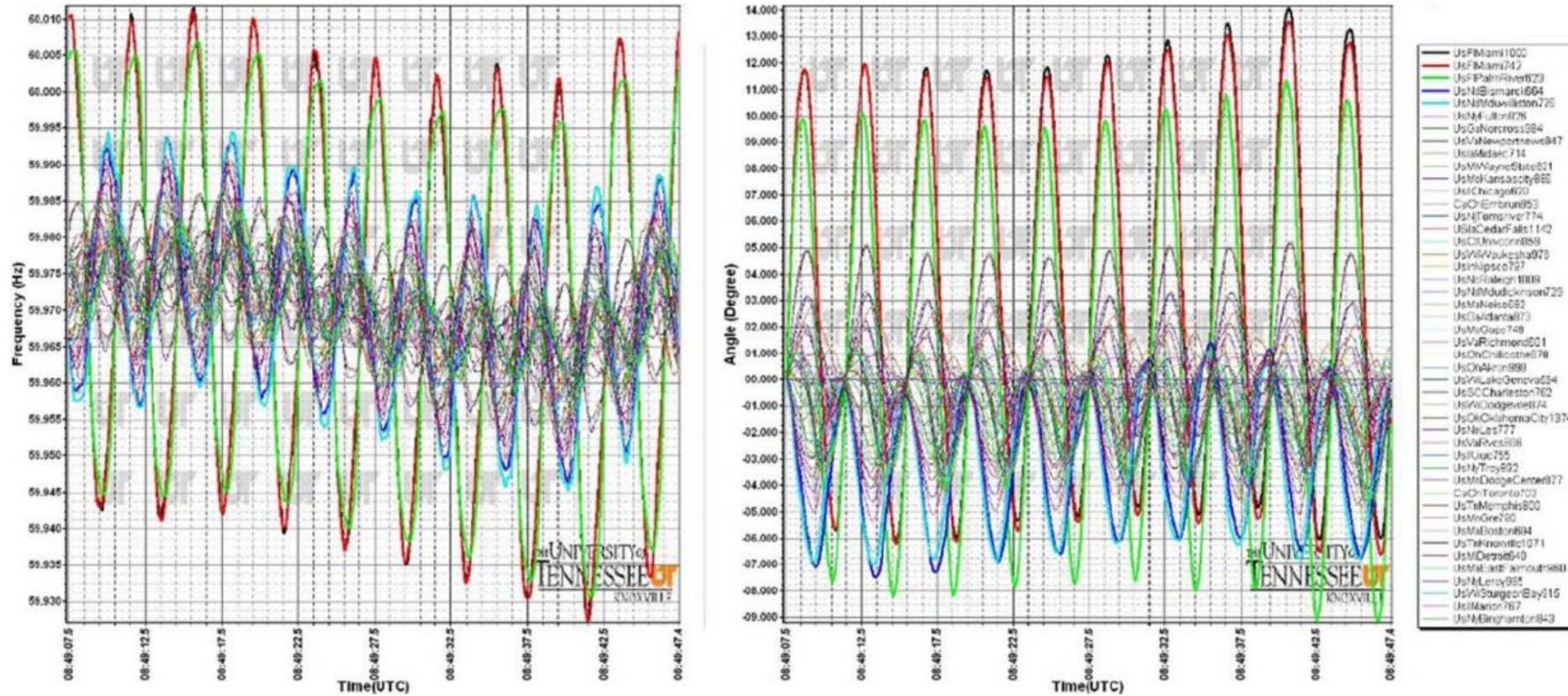


Figure 1: Frequency and Phase Angle Measurements from across the Eastern Interconnection (Source: UTK/ORNL) [2]

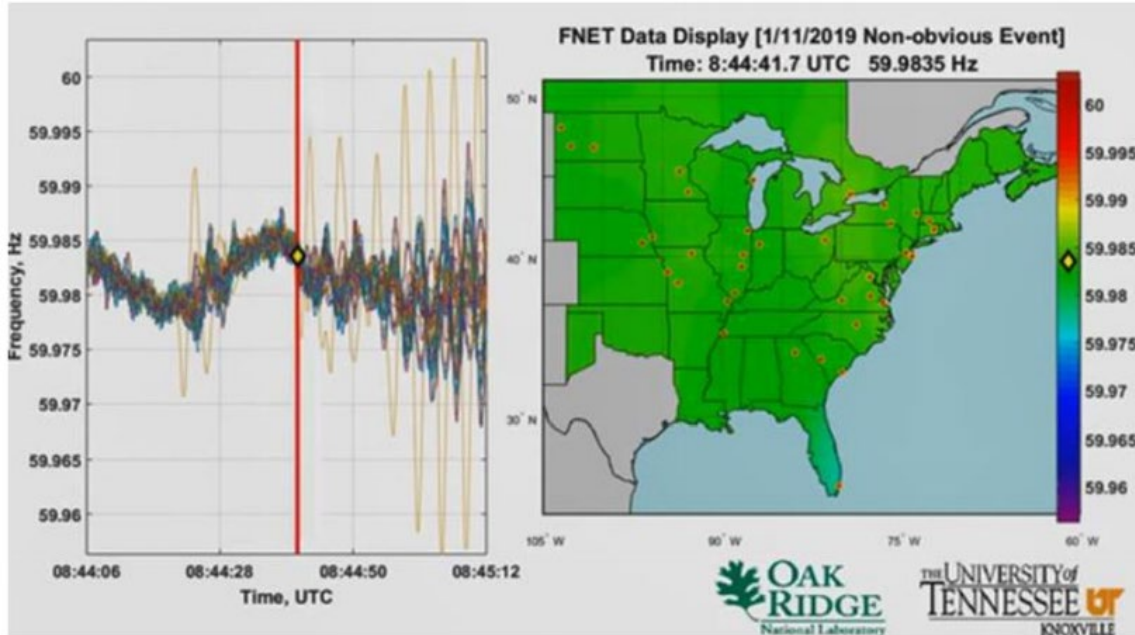


Figure 2: Beginning of the Oscillation Disturbance [2]

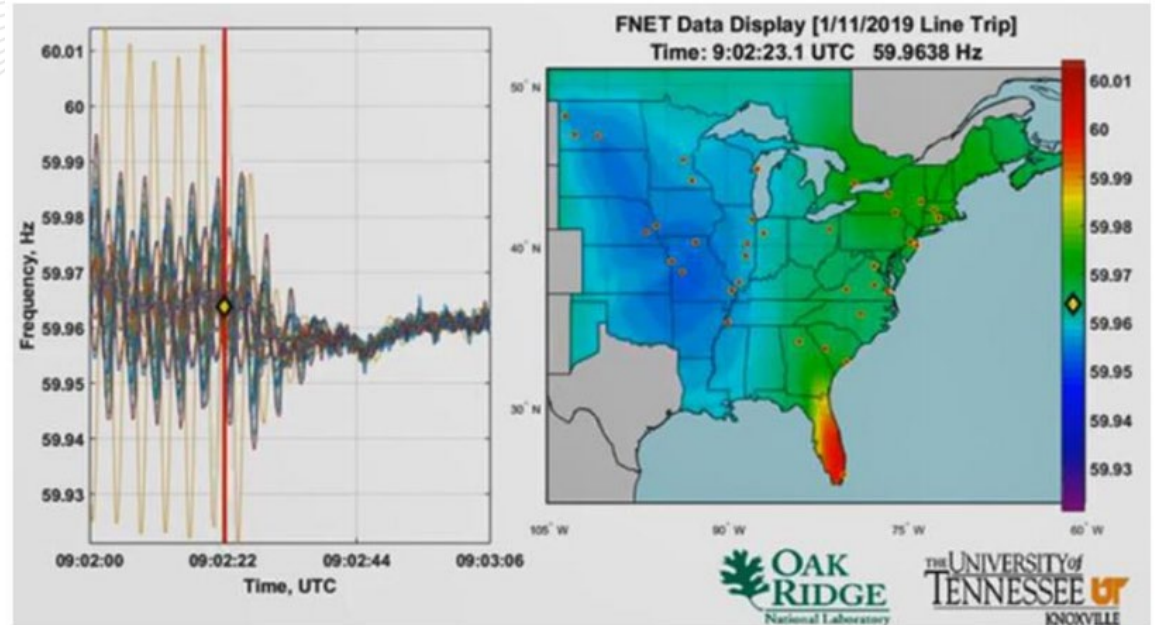


Figure 3: Near the End of the Oscillation Disturbance [2]

- Generator turbine controls (and other types) should avoid using a reset timer with a period close to the reciprocal of the natural system modes
- The design of turbine controls with single point of failure should result in fail-to-safe conditions if failure occurs
- The PLI circuit design should consider tripping the unit after a short time of persistent alarms
- Training for actions to take/avoid during oscillations should be developed and reviewed periodically
- The GOP and BA should communicate as soon as significant unit output oscillations are noticed

- RCs should make use of real-time oscillation detection tools
- System operators should contact those who may be impacted
- RCs should consider using interconnection-wide PMU and SCADA data to jointly develop oscillation detection and source location applications
- Open-source, publicly available oscillation analysis tools should be developed
- Commercially available simulation software should develop/improve the capability of simulating forced oscillations

[1] 1/11/2019 Eastern Interconnection Oscillation Event

<https://www.pjm.com/-/media/committees-groups/committees/oc/20190205/20190205-item-19-oscillation-event-review.ashx>

[2] Interconnection Oscillation Disturbances

https://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/LL20210501_Interconnection_Oscillation_Disturbances.pdf

Presenter:

Donnie Bielak, donnie.bielak@pjm.com

SME:

Donnie Bielak, donnie.bielak@pjm.com

NERC Lessons Learned



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com