Power System Dynamic Phenomena: Correlating Theory with Real-life Measurements

Keynote Session D I

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Abstract:

The study of the transient behaviour of a power system is of great practical importance. Mathematical modelling and analysis of a power system predicts fascinating phenomena, both “electro-magnetic” and “electro-mechanical,” like travelling waves, network resonances, unstable power swings, loss of synchronism etc. A few of these phenomena can be replicated using controlled experiments on scaled laboratory models, but in most cases it is difficult to scale down the realistic parameters of high power and high voltage components. Therefore, the phenomena are mostly revealed to a student through computer simulations, which are more flexible, but dependent on modelling accuracy.

A real-life power grid is continually subjected to naturally occurring disturbances, which reveal its underlying dynamic characteristics. Study of the transients following these disturbances can partly compensate for the subdued or missing laboratory experience. The availability of good instrumentation, precise time-synchronization, ample storage and easy exchange of information due to the internet can now facilitate the creation of a repository of real-life transient measurements, which can lead to a better appreciation of the theory.

To bring out this point, this talk presents a selection of interesting measurements obtained through laboratory experiments and real-life disturbance records, and connects them to the known theory.