National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Incorporating Frequency Dynamics into Load Flow Analysis: A Multi-Area Frequency Dependent Approach
Speaker	: Dr. Ananyo Sengupta
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Venue	: New Seminar Room (EE 401)
Date and Time	: 13 Nov 2024 (4:15 PM)
Abstract	: Load flow analysis is an essential computational technique used for purposes such as power system design, expansion, and efficient control. The results of a load flow analysis consist of voltage phasors at network buses, active and reactive power flow in transmission lines, and reactive power injections at generator buses. However, it is imperative to calculate the power system frequency for a specific loading condition, a task that none of the load flow techniques have tackled. This work presents a Multi-area Frequency Dependent Load Flow (MA-FDLF) technique that can accurately determine the voltage phasors and frequencies in each control region. The initial step involves doing sensitivity analysis to establish a linear correlation between bus injections and voltage phasors and frequency. The Jacobian matrix for load flow computations is constructed based on this linear relationship. The paper also discusses a technique for estimating the frequencies of areas in power systems, taking into account the dynamics of the system. The suggested method is subsequently evaluated using various loading situations and contingencies on test systems, including IEEE 39-bus, and 118-bus systems. The suggested method's results are also compared with the NRLF methodology to demonstrate its accuracy in calculating the system voltages and frequencies.