National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Fully Adaptive and Semi-Adaptive Frequency Sweep Algorithm Exploiting Loewner-State Model for EM Simulation of Multiport Systems
Speaker	: Shilpa T N (Rollno : 521ee1012)
Supervisor	: Rakesh Sinha
Venue	: EE401
Date and Time	: 30 Apr 2025 (5:30)
Abstract	: This work employs a fully adaptive and semi-adaptive frequency sweep algorithm using the Loewner matrix-based state model for the electromagnetic simulation. The proposed algorithms use two Loewner matrix models with different or the same orders with a small frequency perturbation for adaptive frequency selection. The error between the two models is calculated in each iteration, and the next frequency points are selected to minimise the maximum error. With the help of memory, the algorithm terminates when the error between the model and the simulation result is reached within the specified error tolerance. In the fully adaptive frequency sweep algorithm, the method starts with the minimum and maximum frequencies of the simulation. In the semi-adaptive algorithm, a novel approach has been proposed to determine the initial number of frequency points necessary for system interpolation based on the electrical size of the structure. The proposed algorithms have been compared with the Stoer&ndashBulirsch algorithm and Pradovera&rsquos minimal sampling algorithm for electromagnetic simulation. Two examples are presented using MATLAB R2024b. The results show that the proposed methods offer better performance in terms of speed, accuracy and the requirement of the minimum number of frequency samples. The proposed method shows remarkable consistency with full-wave simulation data, and the algorithm can be effectively applied to electromagnetic simulations.