Scheme for Promotion of Academic and Research Collaboration (SPARC) Sponsored One Week Workshop on

Introduction to Electromagnetic Metasurface and Modelling Using ANSYS-HFSS

27th April 2026 to 1st May 2026

Organized by

Department of Electronics and Communication Engineering

National Institute of Technology

Tiruchirappalli,

TamilNadu- 620015, India.

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About NIT Tiruchirappalli

National Institute of Technology Tiruchirappalli is one among the premier Institutions of India and is well known for its high standards in teaching and research. It offers 10 undergraduate and 23 Postgraduate programs in the disciplines of Engineering, Science, Architecture and Management. The Government of India under NIT Act has declared it as an Institute of National Importance. NIT Tiruchirappalli retained its No. 1 position among all NITs in the NIRF ranking. NITT has a sprawling campus of over 800 acres, and is equipped with state-of-the-art infrastructure cutting-edge laboratories, modern learning facilities, and industry partnerships to address global challenges. The Institute has signed MoU's with various Industries and Institutions both in India as well as in abroad to promote collaborative research and consultancy.

About the Department

The Electronics and Communication Engineering (ECE) Department was established in the year 1968. The vision of the Department is to provide valuable resources for industry and society through excellence in technical education and research. The Department offers Undergraduate, Postgraduate, Research degrees (M.S. & Ph.D.) programs. Research in the Department focuses on various disciplines such as Communication systems, Wireless networks, Signal and Image Processing, RF MEMS, Microwave Antennas, MIC, Optical Communication, Photonics and VLSI systems.

About the Program

This workshop is being organized by NIT-Trichy, with a resource person from Carleton University, Ottawa, Canada as part of SPARC project and scheduled at Department of Electronics and Communication Engineering, NIT Trichy, Tamil Nadu. The Scheme for Promotion of Academic and Research Collaboration (SPARC) aims at improving the research ecosystem of India's Higher Educational Institutions by facilitating academic and research collaborations between Indian Institutions and the best institutions in the world from 28 selected nations to jointly solve problems of national and international relevance.

About the Workshop

This lecture series focus on the fundamental concepts and cutting-edge research in periodic structures, electromagnetic metasurfaces, and leaky wave antennas. The course is designed to provide a comprehensive understanding of the theoretical principles, analytical techniques, and practical realizations in these domains, equipping students and researchers with the tools to explore and innovate in the field of modern electromagnetic systems.

Eligibility

The programme is open to Faculty and Students (B.Tech, M.Tech and Ph.D) of AICTE/UGC approved Engineering and Technology Colleges and working professionals in government agencies. Number of participants will be limited. Certificates will be provided to the participants with minimum of 80% attendance in the workshop.

Workshop Contents

Day-1: Surface Susceptibilities & GSTC

GSTC theory recap (χee, χmm, χem, χme for bi-anisotropy), physics insights. (Magneto-electric coupling, bi-anisotropic effects), spatial dispersion introduction & limitations, HFSS periodic structures quick review (Floquet ports, Master/Slave boundaries).

Day-2:Unit-Cell Modelling in HFSS

Variety of unit cells (square patch, split-ring resonator, Jerusalem cross, wire-grid, asymmetric designs for bi - anisotropy), geometry setup, boundary / excitation / mesh setup, solve, extract S-parameters (real-time demo & participant replication).

Day-3: Susceptibility Extraction

Practical live demonstration of susceptibility extraction (S-to-χ formulas for normal & oblique incidence), real-time HFSS export + post-processing (MATLAB / Python / HFSS calculator), homogenization discussions (effective parameters versus GSTC), live HFSS validation / comparison demos.

Day-4: Passive & Active Device Modelling + Leaky-Wave Basics

Lumped RLC (passives), varactor (variable C sweep / co-sim), PIN diode (ON/OFF states), tunable R/T demos on multiple unit-cell types; introduction to leaky-wave antennas (LWA): physics (slow / fast waves, radiation leakage), guiding vs. leaking, uniform / quasi-uniform / periodic LWAs, metasurface - based LWAs.

Day 5:Array Simulations, LWA Modelling/ Eigen modes & Skills Wrap-Up

Infinite vs. finite array comparison, small finite array example; LWA modelling in HFSS (dispersion analysis via eigenmode solver, phase sweep on master/slave boundaries for β & α, leaky-mode identification, dispersion diagram plotting); spatial dispersion in-depth (wavevector dependence, HFSS checks fornon-local effects); full workflow summary; LaTeX for reports/slides & effective presentation skills (structuring results, visuals, Q&A tips, demo best practices).

RESOURCE PERSONS

Dr. Shulabh Gupta is an Associate Professor in the Department of Electronics at Carleton University, Ottawa, Canada. He specializes in applied electromagnetics, microwave and millimeter-wave engineering, antennas, and metasurfaces. His research focuses on advanced electromagnetic systems used in high-speed wireless communication, smart antennas, spectrum analysis, and real-time radio signal processing.Dr. Gupta completed his Ph.D. in Electrical Engineering from École Polytechnique de Montréal. He is a Senior Member of the Institute of Electrical and Electronics Engineers(IEEE).He has contributed significantly to research in next-generation wireless and electromagnetic systems.

Note: Resource persons are Dr. Shulabh Gupta from Carleton University, Ottawa, Canada, and Professors from NIT Tiruchirappalli.

REGISTRATION DETAILS

HYBRID MODE

No Registration Fee

Last date of registration: 20th April 2026

Register online using the link:

https://forms.gle/KpDbJaMnZCUKXnq77