

ABOUT SPARC: Scheme for Promotion of Academic and Research Collaboration (SPARC) is a Ministry of Education, Government of India initiative to improve research ecosystem in India. It supports national premier educational institutions by facilitating academic and research collaborations between Indian institutions and the best and selected institutions across the world's 28 nations. The collaborative educational networks will work on common issue of national or international relevance. It encourages international faculty to visit Indian institution and their long-term stays to teach courses and conduct workshops for the benefit of Indian researchers and students in the selected research area. Also, it funds Indian students to visit and access the premier laboratories worldwide for training and experimentation. As an outcome patents, monographs, and world-class publications will be produced.

COURSE OVERVIEW: Magnetic field generation and evolution models for different planetary, celestial and galactic bodies are capable of describing a large variety of observational material. Despite great successes in recent decades in numerical magnetohydrodynamics and with detailed research in some specific problems, asymptotic methods still need to be used to clarify the magnetic field generation mechanism in dynamo theory. In this course, present/previous asymptotic methods and numerical methods are presented together with the results of their application to the simulation of galactic, solar, stellar and planetary magnetic activities. Different asymptotic and numeric solutions will be explained in detail with their methodical and practical usefulness for students in the computational sciences, basic sciences, Civil engineering, Chemical engineering, Physics, Applied Mathematics, Climate, Marine, Ship crating, Air crafting, programming and computing.

OBJECTIVES:

- (i) Motivate mathematicians to solve complex physical problems.
- (ii) Show how various branches of mathematics are indispensable in solving real problems.
- (iii) Introduce the basic physical background for the topics.
- (iv) Strengthen participants' ability to see correspondence between the physics and mathematics.
- (v) Enhance the ability of participants to choose crucial parameters and estimate their values.

COURSE CONTENTS:

- Introduction to dynamo: Galactic, Solar, Stellar and Planetary magnetism.
- Analytical solutions for asymptotic mean-field dynamo problems.
- Dynamical systems for modelling of solar magnetic activity.
- Stellar magnetic activity as dynamo problem.
- Planetary-type dynamo: Numerical modelling.
- Magnetic scaling laws for Planets, Moons and Stars.

WHO CAN PARTICIPATE?

- Student at all levels (MSc / MTech / PhD / Post Doc) involved in
- Faculty from reputed academic institutions and technical institutions working in
- Executives, engineers and researchers from government organizations including R&D laboratories and industry, related to computational sciences, basic sciences, Civil engineering, Chemical engineering, Physics, Applied Mathematics, Climate, Marine, Ship crating, Air crafting, programming and computing.

REGISTRATION Process:

No Registration FEE (Register only if you are attending physically)



A One-Week Workshop on

Magnetohydrodynamics in the Light of Astrophysical Dynamics

3-8 March 2025

International Faculty

Prof. Maria S. Kotelnikova

Department of Physics,

Novosibirsk State University, 2 Pirogova st.,

Novosibirsk, 630090 Russia

Coordinators

Prof. H.P. Rani

Prof. D. Jaya Krishna

Organized

by

**DEPARTMENTS OF MATHEMATICS &
MECHANICAL ENGINEERING**

**NATIONAL INSTITUTE OF
TECHNOLOGY WARANGAL**

TELANGANA STATE – INDIA

FACULTY OF THE COURSE



Prof. Maria S. Kotelnikova, Faculty of Department of Physics, Novosibirsk State University Russia, research interests include convection, geo-dynamo, vortices structure and interaction, turbulence. She contributed her vast knowledge in the prestigious Scientific committees in different positions. She has received many grants from the Russian Federation and Russian Foundation for Basic Research. She has very good command in gas dynamics, physical analysis, numerical methods in physics of continuous media, electrodynamics.



Prof. STARCHENKO Sergey Vladimirovich, Chief Scientist in IZMIRAN, Moscow Russia and Consulting Professor in Novosibirsk State University, Department of Physics, Lavrentyev Institute of Hydrodynamics, Chair of Continuous Media, since 1985, is working on magnetism and hydrodynamics in the Earth, planets, stars, galaxies and other objects. His main specialization is analytic and asymptotic modeling of convection and magnetism in fast rotating shells. Recently he started to work also on data temporal and spectra analyses.



Prof. H.P. Rani from department of mathematics, NITW works in the area of Computational Fluid Dynamics. She did her post doctorate with National Science Council Fellowship in the prestigious National Taiwan University, Taiwan and as Research Professor with Brain Korea Fellowship in the Kyung Hee University, South Korea. Her field of specialisation includes Finite Difference and finite volume methods. Also, she contributed in the interdisciplinary research areas like Geophysical fluid flows and Artificial Neural Networks etc.

ABOUT THE INSTITUTE AND WARANGAL:

National Institute of Technology, Warangal (NITW) formerly known as RECW is the first among seventeen RECs set up in 1959. Over the years, the Institute has established itself as a premier Institution in imparting technical education of a very high standard, leading to B.Tech, M.Tech, Integrated M.Sc., B.Sc. B.Ed. and Ph.D. programs in various specializations of Science and Engineering streams. Warangal is known for its rich historical and cultural heritage. It is situated at a distance of 140 km from Hyderabad. Warangal is well connected by rail and road. NITW campus is 3 km away from Kazipet railway station and 12 km away from Warangal railway station. Hyderabad is the nearest Airport from Warangal. NIT Warangal is 2½ hrs drive by cab on Hyderabad - Warangal National Highway.

ABOUT DEPARTMENT: Department of Mathematics was *established in 1959* and has always shared the vision of the institute in striving for excellence in teaching and research activities. The frontier areas of research of the department include: Fluid Mechanics, Bio-mechanics, Mathematical Modeling, Numerical Analysis, Finite Element Method, CFD, Optimization Techniques, Coding Theory, etc. The Department is recognized by AICTE as the only QIP centre for PhD programmes among all NITs. The department started its M.Sc. Applied Mathematics course in the year 1970. In the context of changing needs of the industry, the Department offers B.Tech Mathematics and Computing, M.Sc. (Applied Mathematics; Mathematics and Scientific Computing), Integrated M.Sc Mathematics, and Integrated B.Sc. B.Ed courses. The department has signed MoU with Indian Institute of Geomagnetism.

REGISTRATION Process:

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To register fill the google form:

<https://forms.gle/ZEae8heGbaRkAzGh8>

Preferences are for faculty and research scholars. Maximum allowed participant strength is 50. Additionally, 10 participants from industry are allowed to participate.

Participants will be provided with working lunch and refreshments. Limited accommodation is available for participants in the Visitors Block/ hostel on twin sharing on payment basis day. On prior request, they may be provided accommodation based on the availability.

LAST DATE TO APPLY: 17 Feb. 2025

SELECTION PROCESS:

Candidates registering early will be given preference in short listing process. Total number of seats is limited to 50 only and will be filled on first come first basis. Selected candidates will be intimated through E-Mail.

Limited accommodation is available for participants in the Visitors Block/hostel on twin sharing on a payment basis day. On prior request, they may be provided accommodation based on the availability.

For **any queries** please contact

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