Workshop Schedule

Webpage: https://manavrachna.edu.in/international-workshop

Day	Session 1	Session 2	Session 3
December 06 (Monday)	Inauguration (Time: 9:30AM-10:00AM)	**Prof. Ram Bilas Pachori** IIT Indore ***Title: Wavelet Transform Fundamentals with Signal Processing Applications*** (Time: 10:00AM-11:00AM)	**Prof. Hans Georg Feichtinger** University of Vienna, Austria ***Title: An axiomatic approach to mild distributions*** (Time: 3:30PM-4:30PM)
December 07 (Tuesday)	**Prof. Bin Han** University of Alberta, Canada ***Title: Wavelet methods for numerical PDEs and data science*** (Time: 8:30AM-9:30AM)	**Prof. Khalil Ahmed** Jamia Millia Islamia University, New Delhi ***Title: Applications of Wavelets: Signal & Image Processing*** (Time: 11:15AM-12:15PM)	**Prof. Peter Massopust** Technische Universität München, Germany ***Title: Introduction to Wavelets-I*** (Time: 2:30PM-3:30PM)
December 08 (Wednesday)	**Dr. Ram Jiwari** IIT Roorkee ***Title: Solution Study of Differential Equations using Wavelets*** (Time: 9:00AM-10:00AM)	**Dr. Niraj Kumar Shukla** IIT Indore ***Title: Multiscale Transforms & its Applications*** (Time: 11:15AM-12:15PM)	**Prof. Peter Massopust** Technische Universität München, Germany ***Title: Introduction to Wavelets-II*** (Time: 2:30PM-3:30PM)
December 09 (Thursday)	**Dr. Ratikanta Behera** University of Central Florida, USA ***Title: An Adaptive wavelet method for the solution of PDEs on the sphere*** (Time: 8:30AM-9:30AM)	**Dr. Kuldip Singh** IIIT Naya Raipur ***Title: Wavelet based numerical method for PDEs arising in Finance*** (Time: 11:15AM-12:15PM)	**Dr. Swaraj Paul** TIFR CAM, Bangalore (Time: 2:30PM-3:30PM)
December 10 (Friday)	**Dr. Rajesh Kumar Pandey** IIT BHU ***Title: Fractional Filters for Retinal Blood Vessel Segmentation*** (Time: 10:00AM-11:00AM)	**Prof. Aparajita Ojha** Professor, Department of Computer Science and Engineering, IIIT DM Jabalpur (Time: 11:15AM-12:15PM)	Valedictory Function (Time: 12:15PM-12:45PM)

Report on International Workshop
on

Wavelets and its Applications: Image Processing, Data Science and PDEs

in collaboration with

Department of Mathematics, IIT Indore

December 06th - 10th, 2021

On the occasion of MREI 25 Year - Silver Jubilee Celebration, **Department of Mathematics, Manav Rachna University in collaboration with Department of Mathematics, IIT Indore** organised a five day Workshop on **Wavelets and its Applications: Image Processing, Data Science and PDEs** from **December 06 - 10, 2021** for academicians, researchers and students. Around 600 participants registered and 400 were selected from various universities/institutions from India and abroad (Nepal, Malaysia, UAE, USA etc).

Workshop being initiated on Day 1 by Dr. IK Bhatt, VC, MRU

Workshop was inaugurated in the benign presence of Prof. I.K. Bhat, Hon'ble Vice Chancellor, MRU, Prof. Dr. Sangeeta Banga, Dean Academics; Prof. Dr. Pradeep Varshney, Dean Research and Dean Applied sciences; Prof. Dr. Niraj Kr. Shukla, Head - Department of Mathematics, IIT Indore, Prof. Bin Han, University of Alberta, Canada, Prof. Ratikanta Behra, University of Florida, USA, Dr. Deepa Arora, Head, Department of Mathematics and Dr. Aparna Vyas, Associate Prof. Department of Mathematics. Dr. Deepa Arora delivered the welcome address and Dr. Aparna Vyas briefed about the objective & outcome of the workshop. Prof. I.K. Bhat addressed the gathering and emphasised on the philosophy of Mava Rachna University, its vision and endeavors undertaken to excel on the path of progress. He emphasised the role & importance of Centres of Excellence at MRU and accomplishments gained.

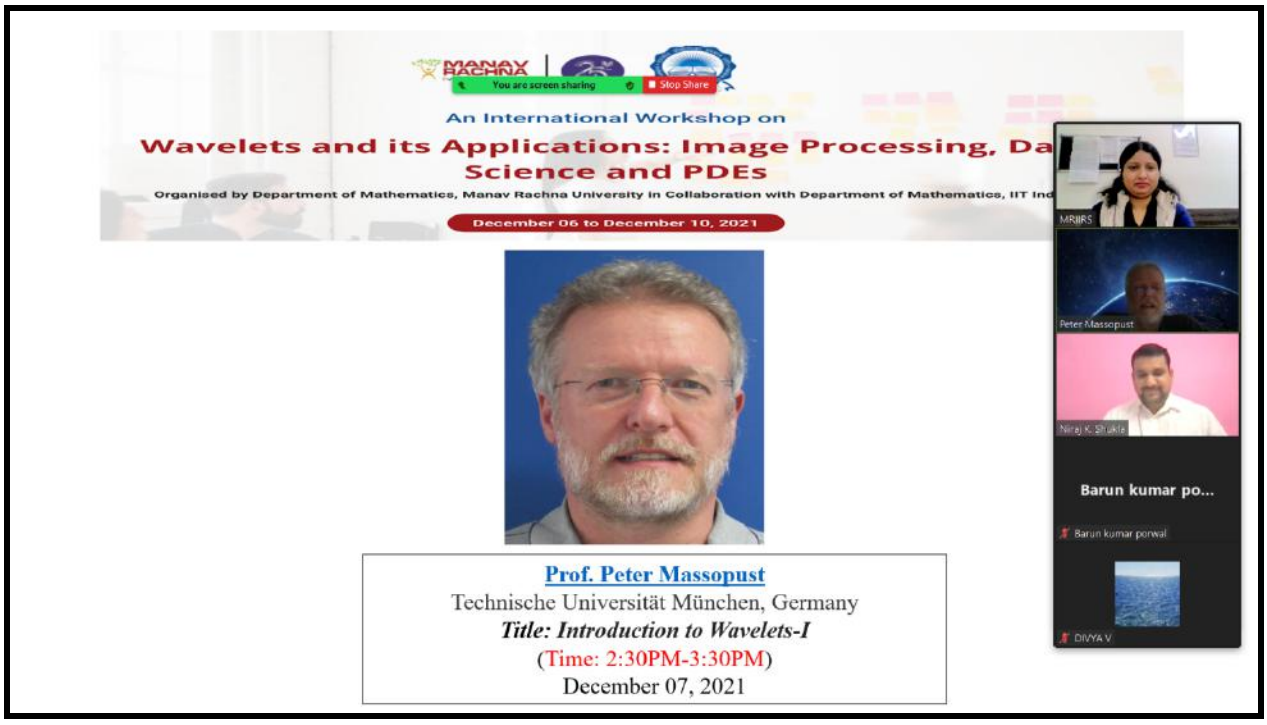
Sir also presented the importance of Wavelets and its multidisciplinary applications in the areas like Engineering Physics, Biomedical, Signal & Image processing, Healthcare Industry, fiscal sustainability etc and appreciated the organisers for convening this prestigious workshop which shall serve as the learning platform in multi disciplinary areas .

Dr. Aparna Vyas, thanked the esteemed guests for joining the Inaugural session.

On the first day, the workshop consisted of two invited talks. First talk was delivered by Prof. Ram Bilas Pachori, Professor, Department of Mathematics, IIT Indore entitled " Wavelet Transform Fundamentals with Signal Processing Applications ". The second talk was delivered by Prof. Hans Georg Feichtinger, University of Vienna, Austria entitled "An axiomatic approach to mild distributions". Prof. Pachori briefly explained the transition from Fourier to Wavelet transforms, while Prof. Hans Georg Feichtinger discussed the advantages of the axiomatic approach to mild distributions and explained a Banach space for test functions.

Prof. Khalil Ahmad, Al- falah University continuing the session on 07th December 2021

On December 07, 2021 (Day 2) the workshop comprised of three sessions. The first session was on "***Wavelet methods for numerical PDEs and data science***" **by Prof. Bin Han, Professor, University of Alberta, Canada**, second session by **Prof. Khalil Ahmad, Al-Falah University, Faridabad & formerly Professor & Head, Department of Mathematics, Jamia Millia Islamia** on "***Applications of Wavelets: Signal & Image Processing*** and session third by **Prof. Peter Massopust, Technische Universität München, Germany,** on "***Introduction to Wavelets-I***". Day 2 sessions covered the history & emergence of Wavelet theory and its applications in the solution of PDEs.



Prof. Peter Massopust initiating the session on "Introduction to Wavelets-I"

On December 08, 2021 (Day 3) the workshop consisted of 3 sessions. First session was by **Dr. Ram Jiwari, Associate Professor, Department of Mathematics, IIT Roorkee** on ***"Solution Study of Differential Equations using Wavelets",*** second session by **Dr. Niraj Kumar Shukla, HEAD & Associate Professor, Department of Mathematics, IIT Indore** on "***Multiscale Transforms & their Applications"*** and third session by **Prof. Peter Massopust, Technische Universität München, Germany,** for the talk entitled "***Introduction to Wavelets-II***". Day 3 sessions continued the mathematical construction of the Wavelets, multiscale transforms and its applications in the solution of partial differential equations.

On December 09, 2021 (Day 4) **Dr. Ratikanta Behera, Researcher, Department of Mathematics, University of Central Florida, USA** gave a talk on ***"An Adaptive wavelet method for the solution of PDEs on the sphere"*** followed by **Dr. Kuldip Singh, Assistant Professor, IIT Naya Raipur** on ***"Wavelet based numerical method for PDEs arising in Finance"*** and **Dr. Swaraj Paul, Post doctoral Researcher, TIFR CAM, Bangalore**, on ***"Microlocal Analysis of Singularities using Shearlets".*** Day 4 sessions highlighted the wavelet method for the solution of PDEs & numerical methods for PDEs in finance.

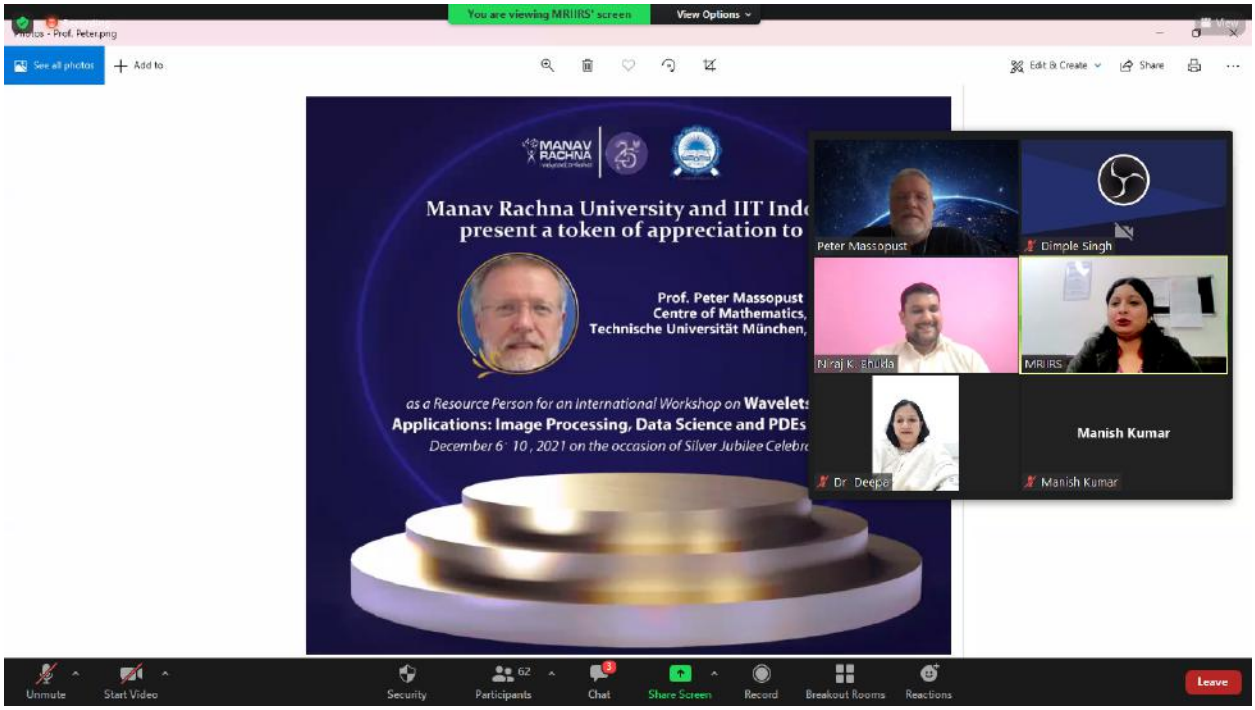
On December 10, 2021 (Day 5) **Dr. Rajesh Kumar Pandey, Associate Professor, Department of Mathematics, IIT BHU** gave a talk on **"*Fractional Filters for Retinal Blood Vessel Segmentation"*** followed by **Prof. Aprajita Ojha, Professor, Department of Computer Science and Engineering, IIIT DM, Jabalpur** on **"*Generative Adversarial Networks with Wavelets for Medical Imaging".*** Both the sessions focussed on multidisciplinary applications of wavelets in the field of medical sciences & Artificial Intelligence.

Day 2 of the workshop (07th December 2021)

The participants had a great learning experience as per their feedback. The valedictory session was chaired by esteemed Prof. Aprajita Ojha, Prof. Khalil Ahmed, Prof. Pradeep Kumar Varshney & Prof. Niraj Kr. Shukla. They addressed the gathering and motivated them for future research in upcoming areas. Dr. Deepa Arora, Head - Department of Mathematics and Organiser of the Workshop concluded the two day workshop and Dr. Aparna Vyas, Associate Professor, Department of Mathematics & organiser of the workshop proposed the vote of thanks.

These five days were very fruitful. Participants got an opportunity to learn, explore and grow in the area of wavelets. The journey of wavelets as covered in the workshop showcased the need and emergence of wavelet theory, detailed basics and its mathematical construction and finally its wide applications in the emerging areas like data science & artificial intelligence, signal processing, image processing, solution of pdes, neural networks, financial sector etc. Each of the sessions showed a great participation number of around 150.

Valedictory ceremony on 10th December 2021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present a token of appreciation to
Prof. Peter Massopust
Centre of Mathematics,
Technische Universität München,
as a Resource Person for an International Workshop on Wavelets
Applications: Image Processing, Data Science and PDEs
December 6 - 10, 2021 on the occasion of Silver Jubilee Celebra
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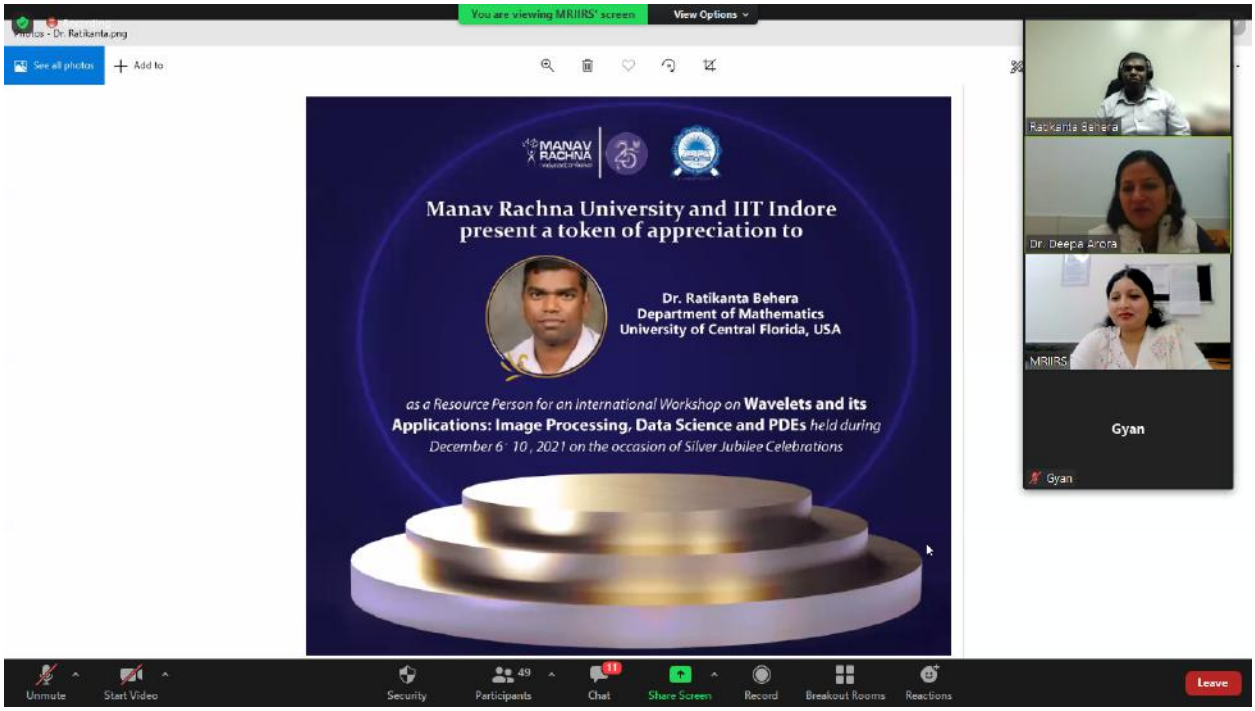
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December 6 - 10, 2021 on the occasion of Silver Jubilee Celebrations
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MANAV RACHNA
An International Workshop on
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Science and PDEs
Organised by Department of Mathematics, Manav Rachna University in Collaboration with Department of Mathematics,
December 06 to December 10, 2021
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