# THE LNM INSTITUTE OF INFORMATION TECHNOLOGY, JAIPUR

## Event Report

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| S. No. | Particulars | Response |
|---|---|---|
| 1 | Name of the Event/ Activity | **Research scholars Day | National Science Day** |
| 2 | Program Category <br>(FDP/ EDP/ UHV-FDP/ Conference/ Workshop/ Webinar/ Seminar/ Invited Talk/ Distinguished Lecture/ Induction Program/ Orientation Program/ Hackathon/ GIAN Course/ Sort-Term Course/ Training Session/ Cultural Program/ Competition/ Sports Event/ ISR Activity/ Charity Program/ Swachhta Program/ Healthcare Activity/ Others) | **Invited Talks** |
| 3 | Theme of the Event <br>(Technology/ Innovation/ Research Methodology/ IPR/ Start-up/ Entrepreneurship/ Skill Development/ Stress Management/ Motivation/ Gender Sensitization/ Women Empowerment/ Career Development/ Leadership/ Awareness/ Social Service/ Mentoring/ RoadShow/ Exhibition/ Others) | **Technology** |
| 4 | Program Level <br>(National/ International/Departmental/ Institutional/ District/ State) | **Institutional** |
| 5 | Program Category <br>(Institute Lead Activity/ Student Lead Activity) | **Institute Lead Activity** |
| 6 | Organized for? <br>(Faculty/ Staff/ Students/ Industry Persons/ Open for All) | **Faculty and Students** |
| 7 | Program Starting Date (dd/mm/yyyy) | **February 28, 2024** |
| 8 | Program Ending Date (dd/mm/yyyy) | **February 28, 2024** |
| 9 | Program Duration (in hours) | **09:50 AM – 05:00 PM** |
| 10 | Event Organized by <br>(Department/ Centre/ Club/ Society/ Group) | **Department of Mathematics** |
| 11 | Name and Contact details of Coordinator(s) | Dr. Manish Garg <br>Dr. Ratan Kumar Giri <br>Dr. Ashish Mishra <br>Dr. Harsh Trivedi |
| 12 | Details of External Partner or Sponsoring Body/ Organization, if any? | - |
| 13 | Mode of Conduction (Online/ Offline/ Hybrid) | **Hybrid** |
| 14 | Venue of the Event | **LT-09** |

| 15 | Details of Participants <br>(Please attach hard copy of the list of participants) | | |
|---|---|---|---|
| | | No. of Internal Students | 13 |
| | | No. of Internal Faculty | 8 |
| | | No. of Internal Staff | 1 |

| | | No. of External Students | - |
|---|---|---|---|
| | | No. of External Faculty | 1 |
| | | No. of External Staff | - |
| | | No. of Industry Persons | - |
| | | No. of International Participants | - |
| | | **Total Participants** | 23 |

| 16 | Details of Invited Speakers/ Experts/ Industry Persons (Name, Designation, Organization Name) | **Prof. Jiten C Kalita IIT Guwahati**<br><br>**Prof. Saurabh Srivastava IISER Bhopal** | |
|---|---|---|---|
| 17 | Funding details | Expenses from the Institute Fund | 32365 ₹ |
| | | Grant received from Sponsoring or Partnering Body/ Organization | — |
| | | Grant received from Govt. Bodies | = |
| | | **Total Expenditure** | 32365 |
| 18 | Details of the Winners along with Prize details? in case of Competition/ Hackathon/ Debate/ Sports event | - | |
| 19 | Brief note about the event | **Attached** | |
| 20 | Program Outcome? If any | | |
| 21 | Google Drive Link of Geotagged and Simple Photographs (Please upload photographs on your google drive and share the link here with editing rights) | https://drive.google.com/drive/folders/1pFsPxY WUXW0vjZ8ScXyqlRkylHsOy4tA?usp=sharing | |

Date of report submission: ___5th March 2024___

Ashish
(Ashish Mishra)

Manish Garg

(Ratan Giri)

**Name and Signature of the Coordinator(s)**

# National Science Day - 2024   LT-9

28/2/24

| | Name | Designation | Signature |
|---|---|---|---|
| ① | Dimble | Ph.D (18pmtn6) | Dimple |
| ② | Ajay Kumar | " 19PMT004 | Ajay |
| ③ | Gautam Kaushik | " 21pmt004 | |
| ④ | Akash Panwar | PhD (21pmt002) | Akas |
| ⑤ | Jayesh Bhardwaj | " (21PMT005) | |
| ⑥ | Amit Gupta | M.Sc. (22MMT001) | |
| ⑦ | Avinash | Ph-D | |
| ⑧ | Deepak | Ph.D (19Pmtee5) | |
| ⑨ | Karuna Pati Tripathi | PhD. (22PMT002) | Karuna Pati |
| ⑩ | Ajal Rehilla | PhD (18pmt005) | |
| ⑪ | Omprakash G. Jangid | PhD (23PMT001) | |
| ⑫ | PRATIBHA GARG. | Faculty | |
| ⑬ | VIKAS GUPTA | Faculty | |
| 14 | A. Patel | Faculty | |
| 15 | Manish Garg | Faculty | |
| 16. | Ratan Kumar Giri | Faculty | |
| 17 | Jiten Ch. Lalita | Visitor | Lalita |
| 18 | S.K. Gautam | Faclity | Gautam |
| 19. | Ashish Mishra | Faculty | |
| 20 | M K Kadalbajoo | Faculty | |
| 21 | Pranay R.K. | Student (22MMT002) | |
| 22. | Bhuvnesh | Phd (20PZ008 | |
| 23. | Saurav Sharma | Jr. Asst. | Guru |
| 24. | PR | | |

# The LNM Institute of Information Technology, Jaipur
## Department of Mathematics

### *One Day Workshop on the Occasion of National Science Day - 2024*

February 28 (Wednesday): 09:50 AM – 05:00 PM

Venue: LT - 09

### Schedule

| February 28 - 2024 | |
|---|---|
| **Inaugural Session**<br>09:50 AM – 10:00 AM | |
| **Morning Session** | |
| **Colloquium Talk - 1**<br>10:00 AM – 11:00 AM | |
| **Speaker:**<br>Dr. Harsh Trivedi<br>LNMIIT Jaipur | **Title:** Berger-Coburn-Lebow representation for pure isometric representations of product system |
| **Colloquium Talk - 2**<br>11:30 AM – 12:30 PM | |
| **Speaker:** Prof. Jiten C Kalita<br>IIT Guwhati | **Title:** Flow past a mounted wedge: The three-fold structure |
| **Lunch Break (01:00 PM – 02:00 PM)** | |
| **Afternoon Session** | |
| **Colloquium Talk – 3 (online)**<br>02:30 PM – 03:30 PM | |
| **Speaker:**<br>Prof. Saurabh Srivastava<br>IISER Bhopal | **Title:** Maximal averaging operators in Harmonic Analysis |
| **Presentation by research scholars ( 03:45 PM – 05:00 PM )** | |
| **Speaker:** Mr. Dimple Saini<br>(03:45 PM – 04:15 PM) | **Title:** Cauchy dual and Wold decomposition for bi-regular covariant representations |
| **Speaker:** Mr. Ajay Kumar<br>(04:15 PM – 04:45 PM) | **Title:** A numerical technique based on Haar wavelets to solve fractional order integro-differential equations |

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**Abstracts of Talks:**

**Colloquium Talk - 1**

**Name:** Dr. Harsh Trivedi

**Title:** Berger-Coburn-Lebow representation for pure isometric  representations of product system

**Abstract:** In 1978 Berger, Coburn and Lebow published an important paper studying tuples of commuting isometries and the C*-algebras that they generate. For pairs of commuting isometries, their study has been further explored by many authors. In this talk we present Berger-Coburn-Lebow representation for pure isometric covariant representation defined on product system of correspondences (on a C*-algebra A). If A is the trivial algebra of complex numbers and the correspondences are also equal to trivial, then the study reduces to the study of a commuting pair of pure isometries. This is a joint work with Dimple Saini and Shankar Veerabathiran.

## Colloquium Talk - 2

**Name:** Prof. Jiten C Kalita

**Title:** Flow past a mounted wedge: The three-fold structure
**Abstract:**

This talk is concerned with the simulation of a complex fluid flow problem involving flow past a wedge mounted on a wall for channel Reynolds numbers $Re_c = 1560$, 6621 and 6873 in uniform and accelerated flow medium [1]. Almost all the flow characteristics of a well-known laboratory experiment of Pullin and Perry [2] have been captured by our numerical simulation. The simulation of the flow across a time span significantly greater than the aforesaid lab experiment is the current study's major achievement. Meanwhile, a grid independence study performed in the process confirmed that our simulation is devoid of any under-resolution or numerical artefact. For the accelerated flow, the onset of shear layer instability leading to a more complicated flow towards transition to turbulence have also been aptly resolved. The quality of our simulation is validated by the close similarity of our simulation to the high Reynolds number experimental results of [3] for the accelerated flow across a typical flat plate. All three steps of vortex shedding, including the exceedingly intricate three-fold structure, have been captured quite efficiently.
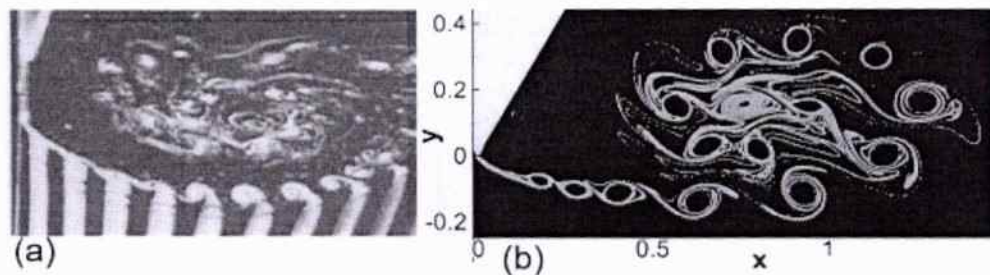
Figure 1: The three-fold structure: Comparison of streaklines between (a) the experimental result of [3] ($t = 2.885$) and (b) the present numerical simulation for $Re_c = 6873$ at $\bar{t} = 20.57 \ sec$ ($t = 2.2$).

# References

[1] Jiten C Kalita and Pankaj Kumar. Vortex dynamics of accelerated flow past a mounted wedge. *Physics of Fluids*, 35:123607, 2023.

[2] DI Pullin and AE Perry. Some flow visualization experiments on the starting vortex. *Journal of Fluid Mechanics*, 97(2):239–255, 1980.

[3] Q-X Lian and Z Huang. Starting flow and structures of the starting vortex behind bluff bodies with sharp edges. *Experiments in Fluids*, 8(1-2):95–103, 1989.

## Colloquium Talk - 3

**Name:** Prof. Saurabh Srivastava

**Title:** : Maximal averaging operators in Harmonic Analysis

**Abstract:** The notion of average is a fundamental idea in mathematics. In this talk we will discuss averages of $L^p-$ functions defined on $\R^n$ over various geometric bodies in $\R^n$ with a focus on euclidean balls and spheres in $\R^n$. We will consider the maximal operators associated with these averages and discuss $L^p-$ estimates for them. The $L^p-$ estimates for maximal operators play the key role in differentiation theory of $L^p-$functions. If time permits, we will discuss some applications as well.

## Talk - 4

**Name:** Mr. Dimple

**Title:** Cauchy dual and Wold decomposition for bi-regular covariant representations

**Abstract:** Using Moore-Penrose inverse, we study the notion of Cauchy dual for covariant representations having closed range and explore several useful properties. We discuss a Wold-type decomposition for the class of {regular} completely bounded covariant representation whose Moore–Penrose inverse is regular. Also we study the Cauchy dual of concave covariant representation modulo kernel of $\widetilde{V}$ is hyponormal modulo kernel of $\widetilde{V}$.

## Talk - 5

**Name:** Mr. Ajay Kumar

**Title:** A numerical technique based on Haar wavelets to solve fractional order integro-differential equations

**Abstract:** We propose the operational matrix approach to solve fractional order integro-differential equations (FOIDEs). This method relies on orthogonal functions defined over the interval [0, 1]. For this goal, we used the Haar wavelets functions in their rationalized form. The advantage of this method is that the FOIDEs are turned into a system of algebraic equations that can be solved using existing methods such as Newton's method, Broyden's method and Steepest Descent.

## Coordinators

Dr. Ratan Kr Giri , Dr. Ashish Mishra, Dr. Harsh Trivedi, Dr. Manish Garg (HOD)

**Photographs**