Department of Mechanical Engineering

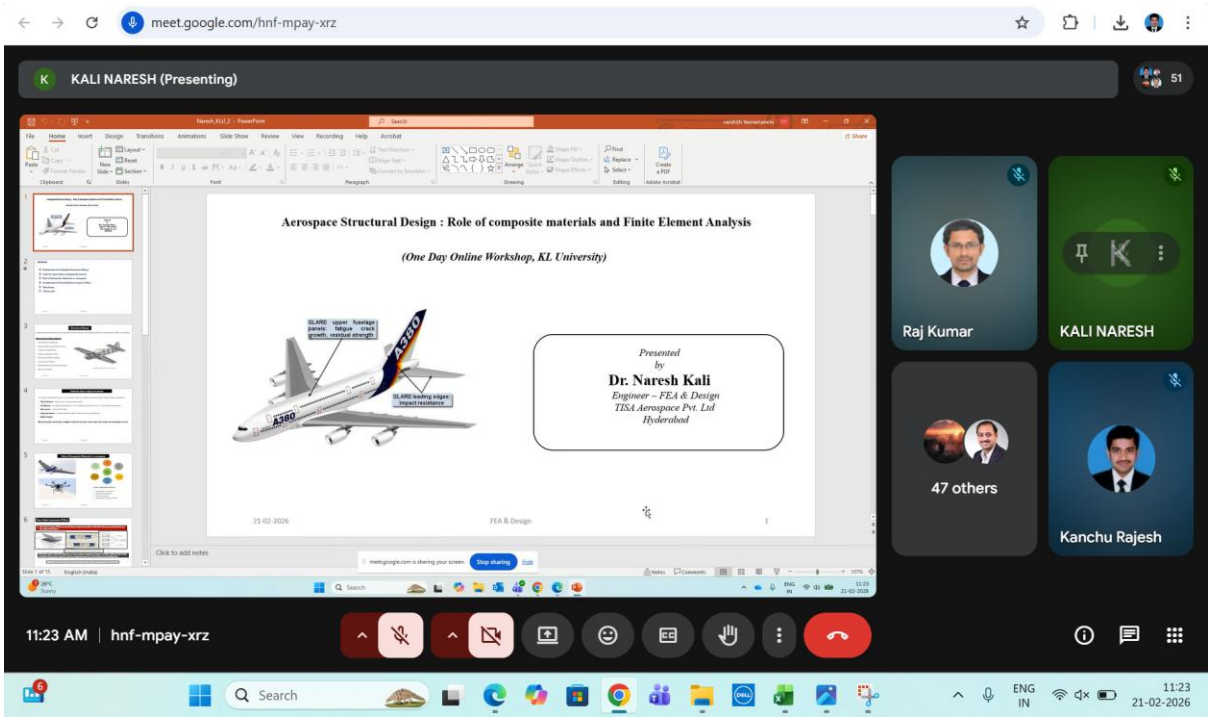
A.Y 2025-2026, Even Semester

Workshop Report on "Aerospace Structural Design: Role of Composite Materials and Finite Element Analysis"

The Department of Mechanical Engineering organized a one day online **workshop** on **"Aerospace Structural Design: Role of Composite Materials and Finite Element Analysis"** on **21-02-2026** for B.Tech students of KLEF. The workshop was delivered **by Dr. Naresh Kali, Engineer – FEA & Design, TISA Aerospace Pvt. Ltd., Hyderabad**. A total of 81 participants including 75 students and 6 faculty members actively participated in the session.

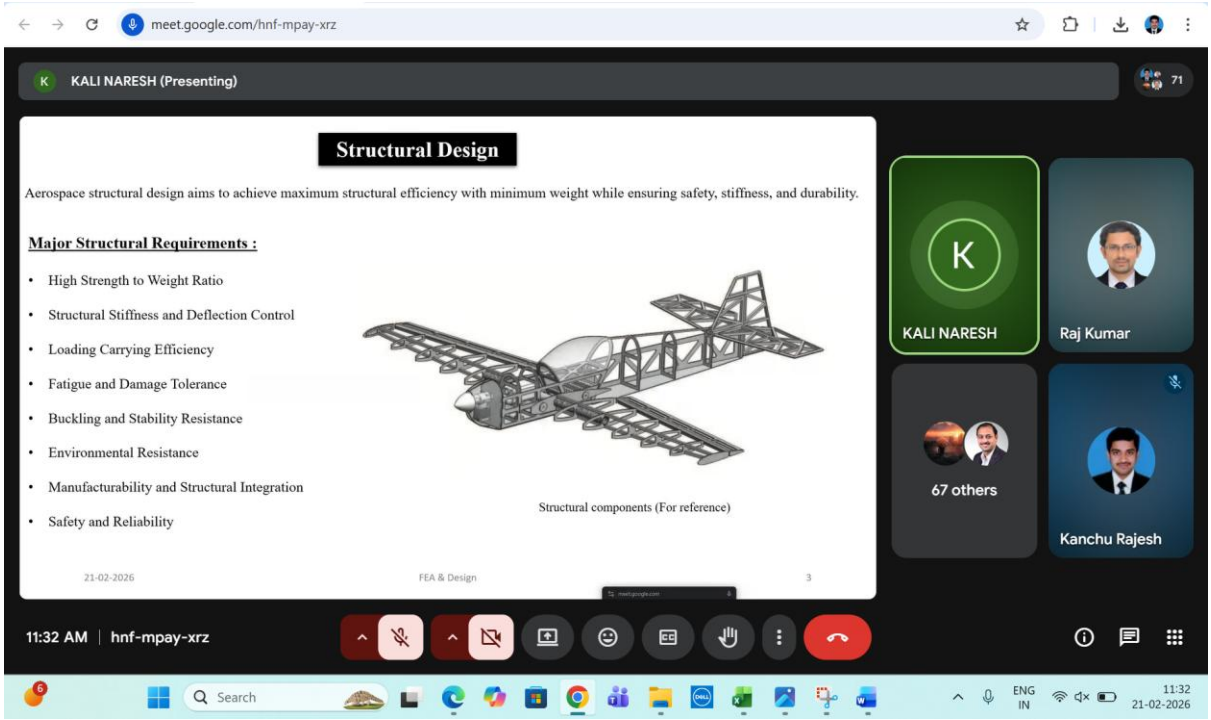
Dr. Naresh Kali, representing TISA Aerospace Pvt. Ltd., brought valuable industry experience in aerospace structural analysis and design. The workshop aimed to bridge the gap between academic learning and real-time aerospace industry practices.

Link: https://meet.google.com/hnf-mpay-xrz

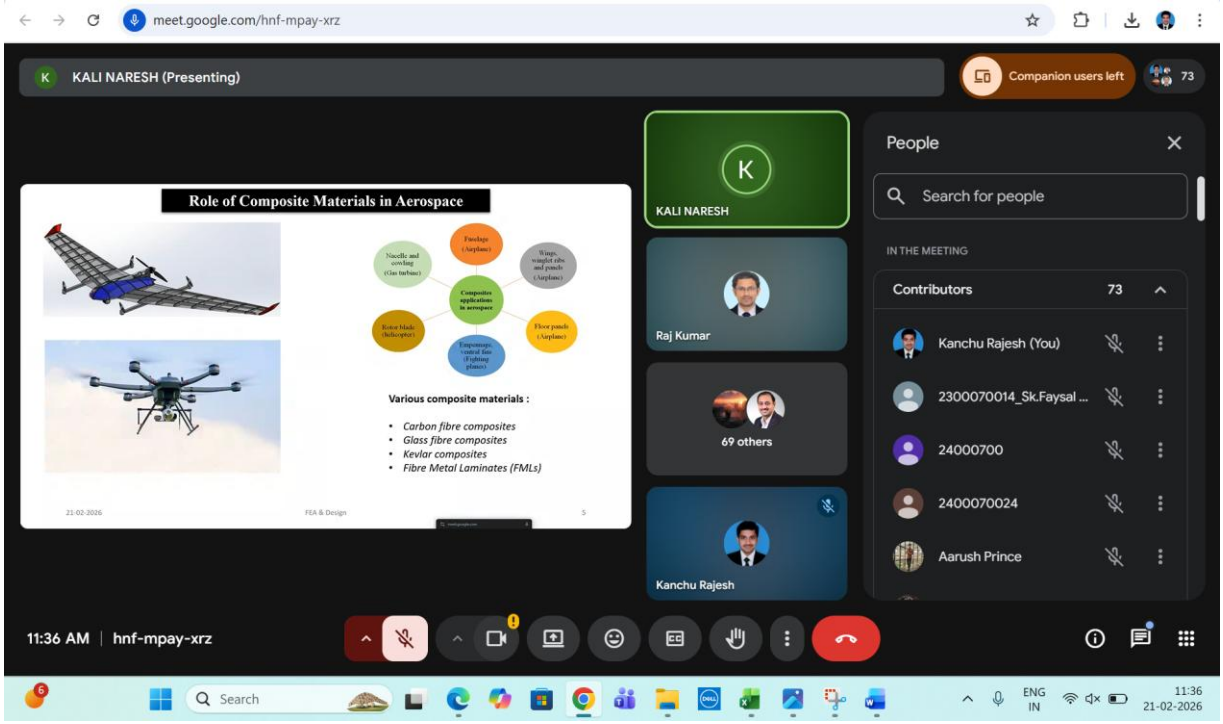


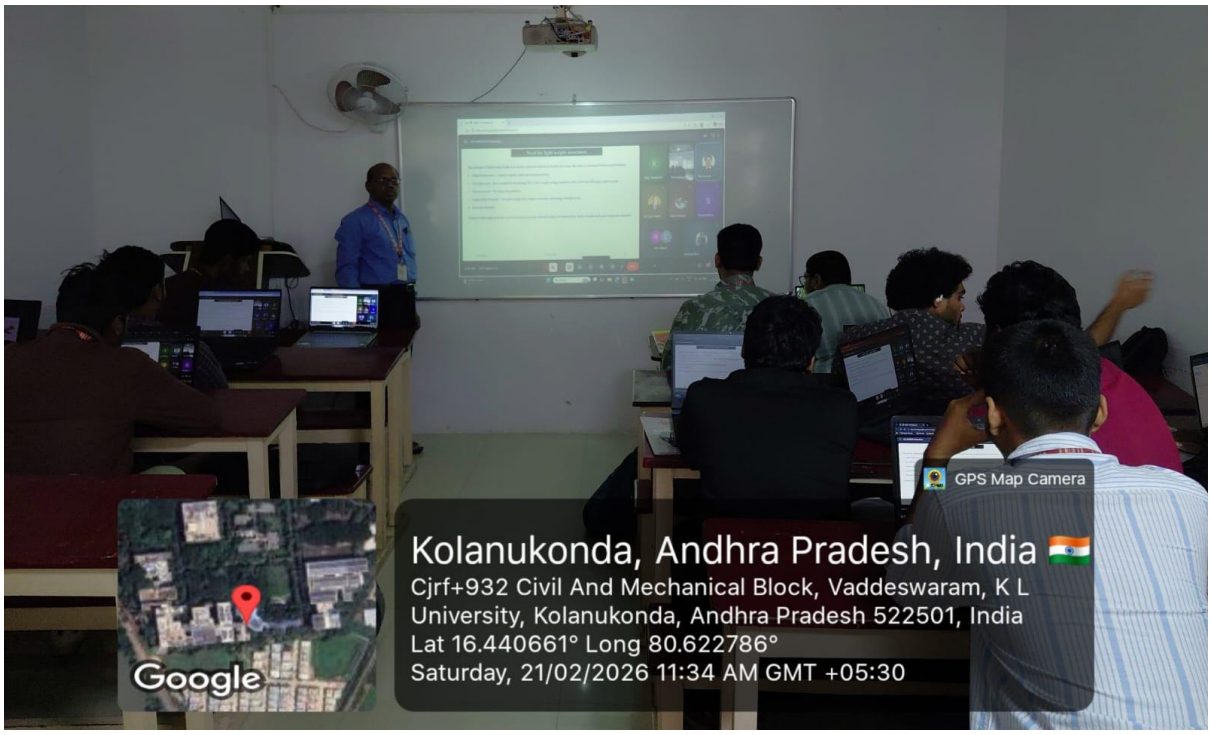
The session began with an overview of aerospace structural design principles. The resource person explained the fundamental requirements of aircraft and spacecraft structures such as strength, stiffness, fatigue resistance, fracture toughness, and safety. He emphasized that aerospace structures must withstand complex loading conditions including aerodynamic loads, thermal stresses, vibration, and impact loads while maintaining minimum weight.

Dr. Naresh highlighted the critical importance of lightweight structures in aerospace engineering. He explained that reducing structural weight directly improves Fuel efficiency, Payload capacity, Operational range, Overall performance. He discussed how even small weight reductions can result in significant cost savings and improved efficiency in aircraft operations.

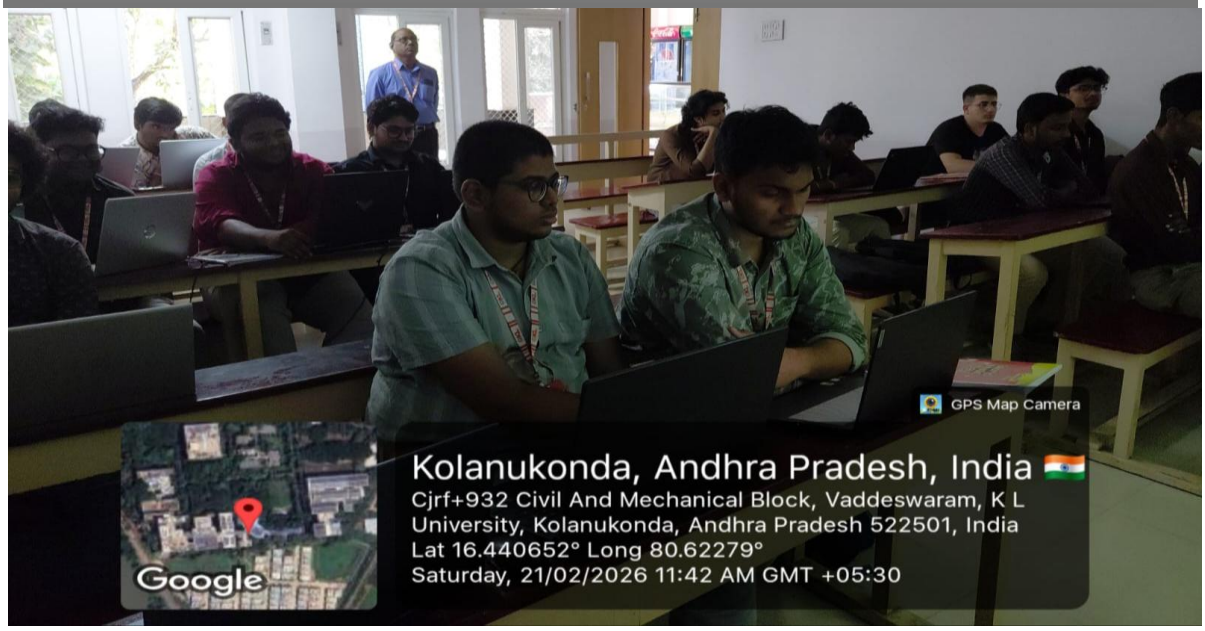


A major focus of the workshop was the application of composite materials in aerospace structures. The speaker explained the advantages of composites over conventional metallic materials such as High strength-to-weight ratio, High stiffness-to-weight ratio, Corrosion resistance and Tailor-made directional properties. He discussed commonly used aerospace composites such as carbon fibre reinforced polymers (CFRP) and glass fibre reinforced polymers (GFRP). The concept of anisotropy and the importance of fibre orientation in load-bearing applications were clearly explained with practical examples.

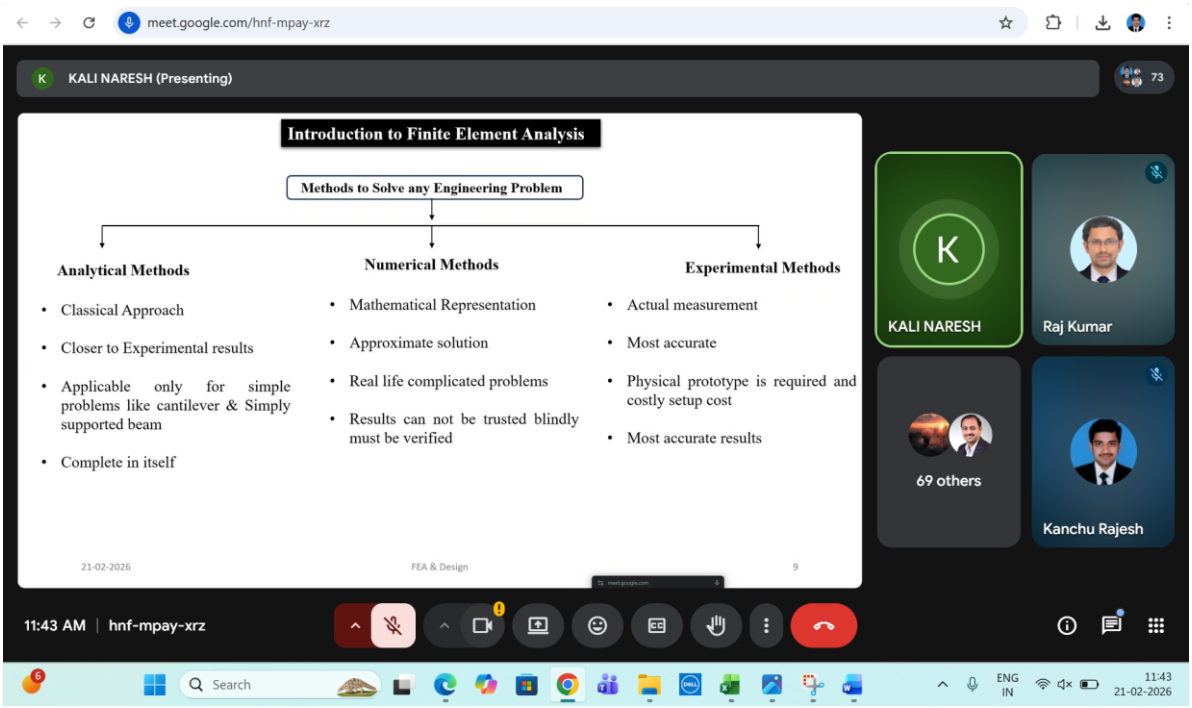


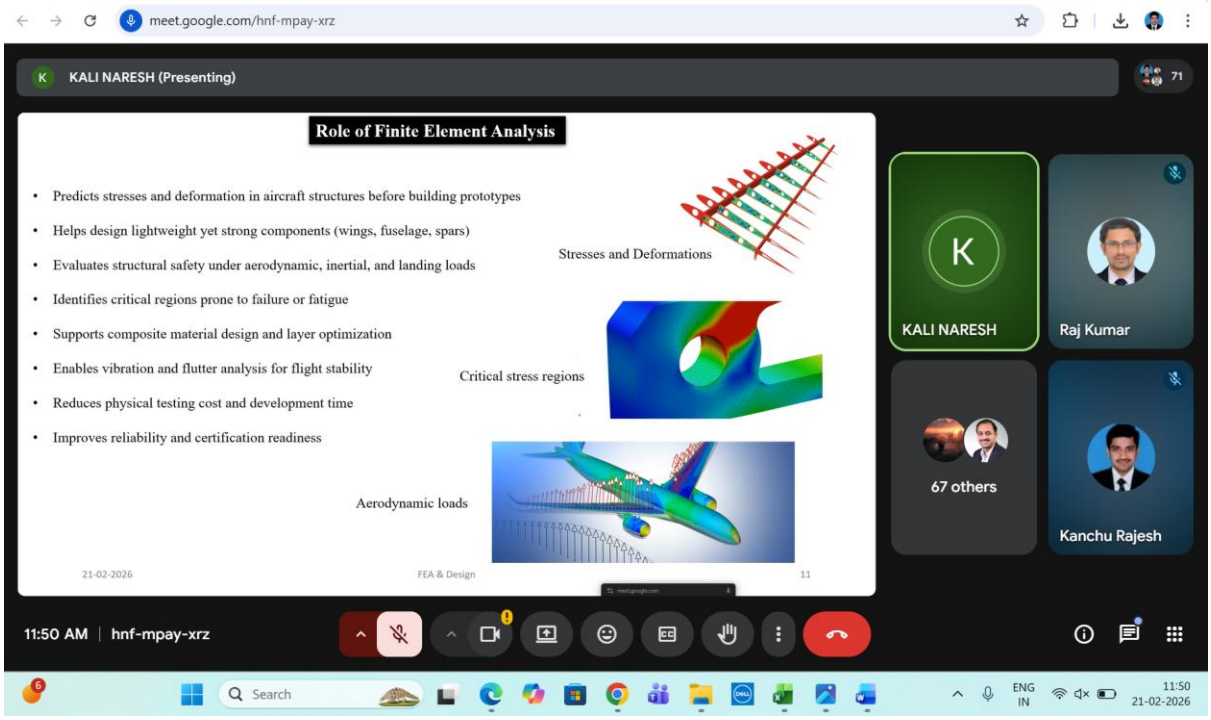


Dr. Naresh introduced Fibre Metal Laminates (FML) as hybrid materials combining metal layers and fibre-reinforced composites. He explained their improved fatigue resistance, impact tolerance, and crack arrest capability. Applications of FML in aircraft fuselage panels and structural components were discussed, highlighting their contribution to enhanced safety and performance.

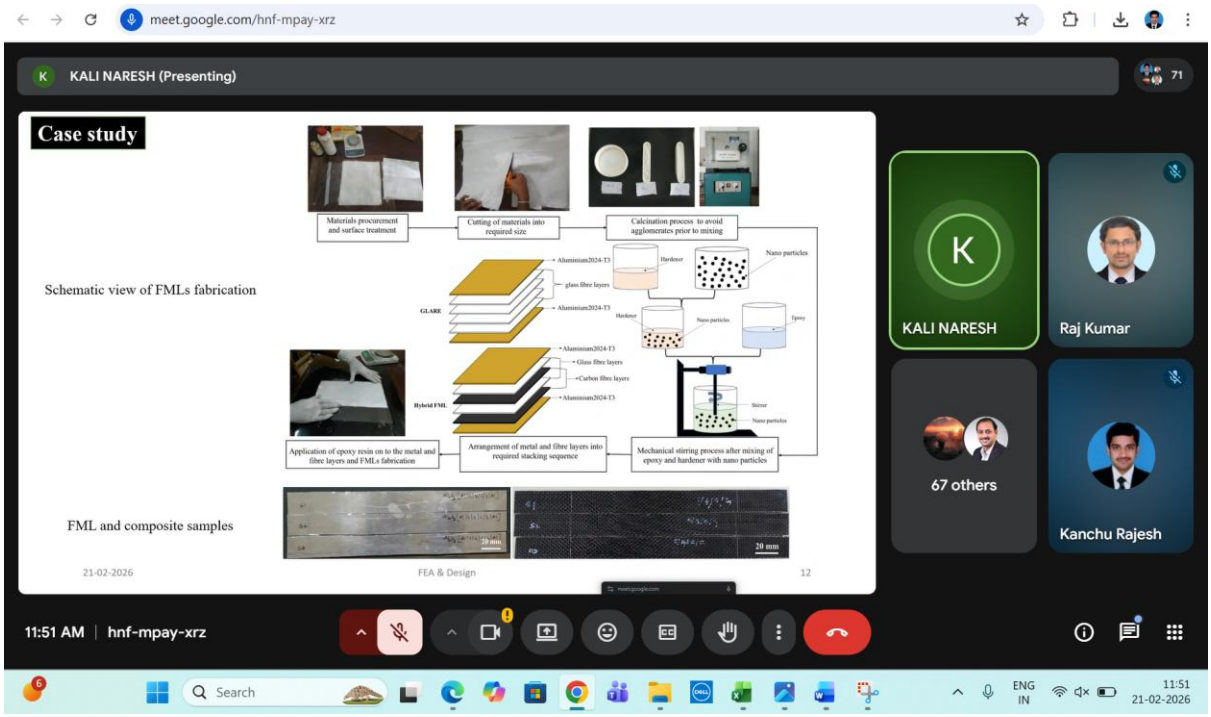


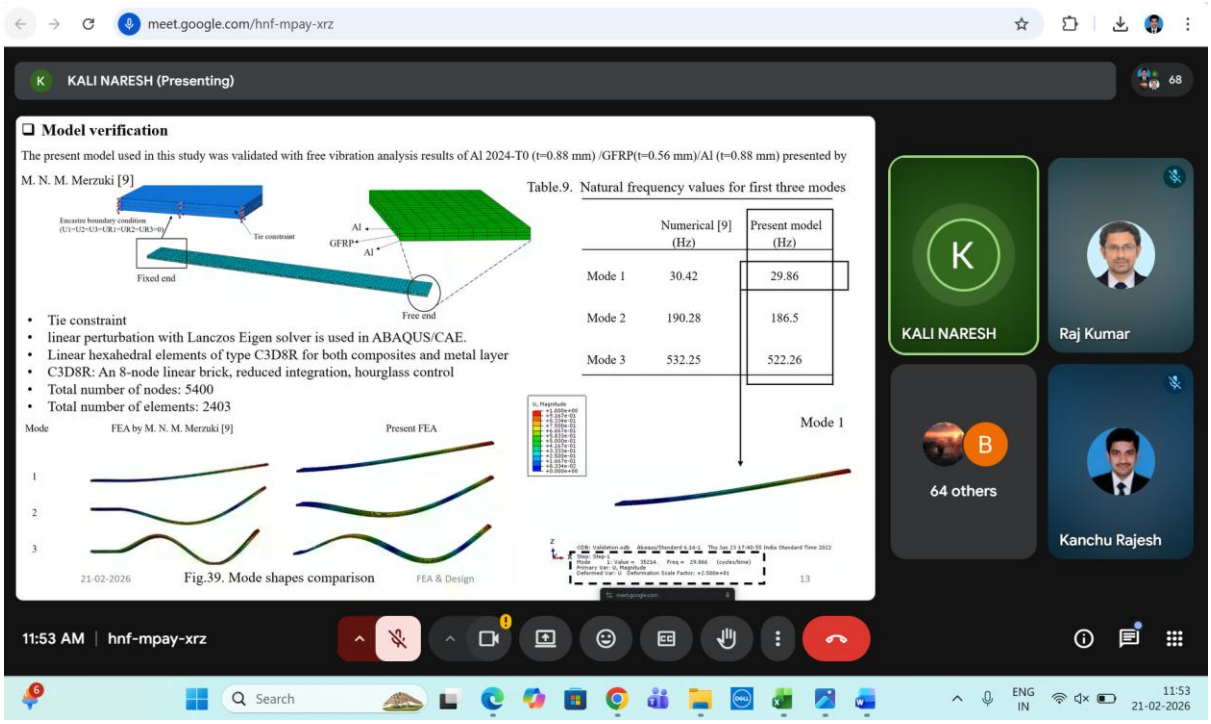
The session then focused on the importance of Finite Element Analysis (FEA) in modern aerospace engineering. Dr. Naresh explained how FEA helps engineers Predict stress and strain distribution, analyze deformation behaviour, evaluate buckling and vibration characteristics, Optimize structural designs before physical prototyping. He described methods to solve any engineering problem using analytical, numerical and experimental methods. The importance of validation and convergence studies in achieving accurate simulation results was also emphasized.



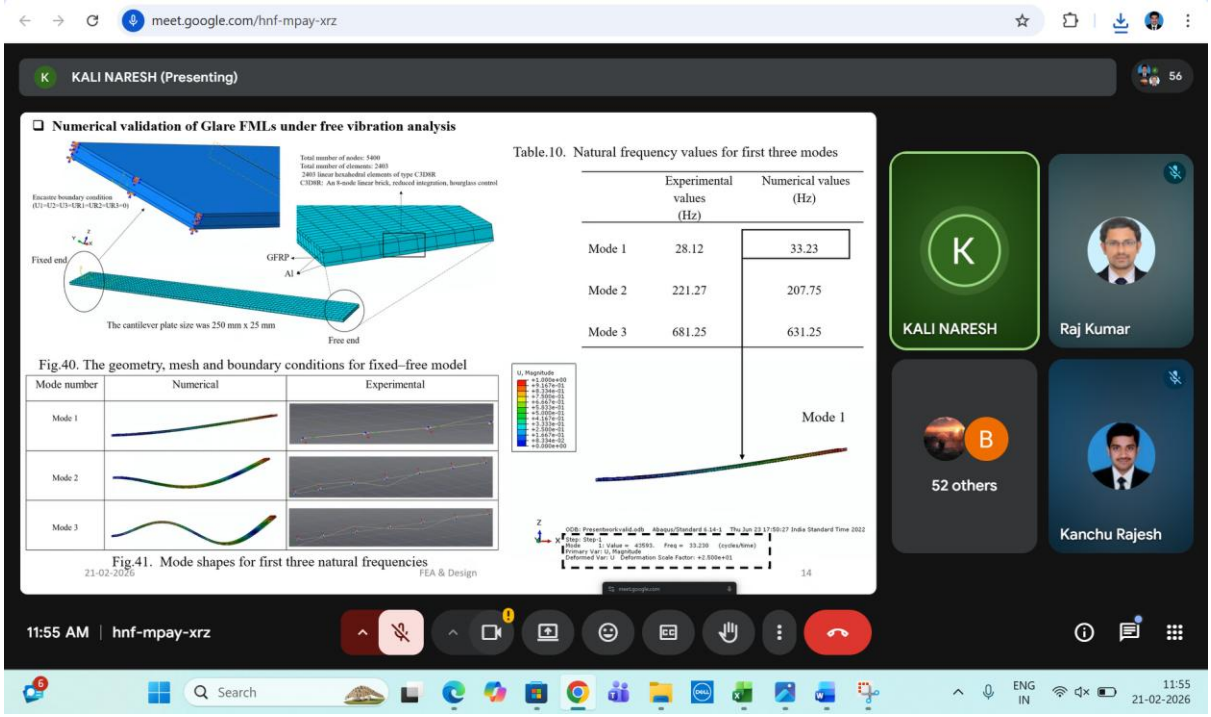


The workshop included practical case studies from aerospace projects. These case studies demonstrated Structural optimization of aircraft components, Failure analysis using FEA, Comparison between metallic and composite structures, Weight reduction strategies through material substitution. The real-world examples provided students with a clear understanding of how theoretical knowledge is applied in industry.





The workshop concluded with an interactive session where students raised questions regarding career opportunities in aerospace design, software tools used in FEA, and the scope of composite materials in future aerospace applications. Dr. Naresh shared insights on required technical skills, including proficiency in CAD/CAE tools and strong fundamentals in mechanics of materials.



Overall, the workshop was highly informative and beneficial for students, offering exposure to advanced concepts in aerospace structural design and industrial practices. The session successfully enhanced the understanding of composite materials and the critical role of Finite Element Analysis in aerospace engineering. Faculty members appreciated the practical orientation and industry relevance of the workshop.

Prepared by **Approved by**