

## Computational Mechanics of Smart Magneto-Electro-Elastic Structures using Finite Element Methods

### Report – Webinar on Computational Mechanics of Smart Magneto-Electro-Elastic Structures, using Finite Element Methods

The Department of Mechanical Engineering, organised a webinar on ‘Computational Mechanics of Smart Magneto-Electro-Elastic Structures, using Finite Element Methods’, on 18/07/2020 through Microsoft Teams, between 10.30 AM and 12.00 PM. The Resource Person was Dr. Vinyas M. CV Raman Post-Doctoral Researcher, Department of Aerospace Engineering, IISc., Bengaluru. The webinar was organized at the inter-college/organisation level for Industry members, faculty members and final year students of Mechanical, Aeronautical and Aerospace Engineering Departments.

The program was inaugurated by Dr. Vivekanand B Huddar, HOD, Department of Mechanical Engineering, MVJCE, followed by a welcome speech. The Guest Speaker was introduced by Dr. Madhusudana C. K., Associate Professor, Department of Mechanical Engineering, MVJCE, Bengaluru.

Dr. Vinyas began the webinar by explaining the importance of finite element analysis in elastic structures with electromagnetic properties taken into consideration. The seminar also included a technical power point presentation which highlighted the key points in current finite element analysis technology, and touched upon all the possible areas where research work can be carried out. The speaker also spoke about the importance of its applications in elastic structures.



### COMPUTATIONAL MECHANICS OF SMART MAGNETO-ELECTRO-ELASTIC STRUCTURES USING FEM

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## TYPES of Elements

Types of elements

8-noded isoparametric element

### Two-dimensional elements

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#### LAGRANGE ELEMENT

•Replicate *any* quad function  
•Complete upto **quad order**

#### SERENDIPITY ELEMENT

•Replicate most of quad functions, but *not all*  
•Complete upto **linear**

The webinar presentation concluded with a query session where the expert answered the questions from the audience, giving suggestions and valuable points. He also gave valuable inputs about research proposal writing in the relevant area.

## Acknowledgements

- Prof. Dineshkumar Harursampath, IISc, India
- Prof. Kattimani, NITK, India
- Administrative Bodies of IISc and NMIT
- Management, faculties and students of MVJCE, Bangalore
- NMCAD , IISc and CREAM research team, NMIT

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7/17/2020

Dr. Sunil Shankar Waddar, Associate Professor, Department of Mechanical Engineering, MVJCE, concluded the webinar by proposing vote of thanks.

The seminar created an opportunity for faculty members and students to understand the need for FEM in electromagnetic elastic structures. It was a good opportunity for those who are interested in doing research work and those who are looking for topics to carry out research.

## Outcomes of the Event:

1. The participants understood the mechanics of smart magneto-electro-elastic (MEE) structures.
2. They gained thorough knowledge of finite element procedures involved while assessing the structural response.
3. They understood the influence of environmental effects on the coupled static response of smart MEE plates and beams.
4. They were able to study higher order shear deformation theory (HSDT) in the FE formulation.
5. They understood the effects of electro-magnetic circuits on overall coupled structural response.
6. The students gained awareness about the opportunities open for Mechanical and Aerospace Engineers in FEA.