

Pravartana 2013

The Mechanics & Applied Mathematics Group at IIT Kanpur organized Pravartana 2013: A TEQIP Workshop on Applied Mechanics from 05 to 07 Oct 2013 in Outreach Auditorium. The workshop was supported by TKIC (TEQIP Knowledge Incubation Center) at IIT Kanpur. The aim was to bring together experts in this field and explore future of collaborative research.

TOPICS DISCUSSED

Following topics were discussed in Pravartana 2013.

- Fluid Mechanics
 - Gas flow in complex microchannels
 - Flow and transport in porous media with applications
 - Polycrystal plasticity models with grain interaction
 - Instability and transition in flow through deformable tubes and channels
- Solid Mechanics
 - Effect of specimen size on strength in concrete under axial compression
 - From Finite Elements to a Virtual Experimentation Station for damaging composites
 - Dynamics of a radially expanding liquid sheet
 - Non-associated Flow Models and Effects on Macroscopic Failure Mechanisms
- Dynamics
 - Teaching of rotations, Euler angles, and angular velocity
 - Aeroelastic Model for Prediction of Blade Loads, Blade Response and Vehicle Response of a Helicopter in General Maneuver
 - Research into stochastic structural dynamic testing and reliability model updating

- Non-linear dynamics of non-smooth systems using smoothening schemes
- Biomechanics and Robotics
 - Non-dimensionality in Slender Elastic Objects
 - Dealing with stress
 - Mechanics of Fibrous Composites: Teaching, Research and New Directions
 - Challenges in Flight control Design, Development and testing

LIST OF SPEAKERS

- Dr. Amit Agrawal, Department of Mechanical Engineering, IIT Bombay
- Dr. K. Muralidhar, Department of Mechanical Engineering, IIT Kanpur
- Dr. Mahesh S. Tirumkudulu, Department of Aerospace Engineering, IIT Madras
- Dr. V. Shankar, Department of Chemical Engineering, IIT Kanpur
- Dr. Arghya Deb, Department of Civil Engineering, IIT Kharagpur
- Dr. C. S. Updhyay, Department of Aerospace Engineering, IIT Kanpur
- Dr. S. Mahesh, Aerospace Engineering, IIT Madras
- Dr. Vikranth Racherla, Department of Mechanical Engineering, IIT Kharagpur
- Dr. A. Chatterjee, Mechanical engineering, IIT Kanpur
- Dr. C. Venkatesan, Department of Aerospace Engineering, IIT Kanpur
- Dr. C. S. Manohar, Department of Civil Engineering, IISc Bangalore
- Dr. P. Chandramouli, Department of Mechanical Engineering, IIT Madras
- Dr. G. K. Ananthasuresh, Mechanical Engineering, IISc Bangalore
- Dr. Madhusudhan Venkadesan, National Centre for Biological Sciences, Bangalore
- Dr. P. M. Mohite, Department of Aerospace Engineering, IIT Kanpur
- Dr. Vijay Patel, DRDO
- Dr. Anurag Gupta, Department of Mechanical Engineering, IIT Kanpur
- Dr. Naveen Tiwari, Department of Chemical Engineering, IIT Kanpur

PARTICIPATING INSTITUTES

Institute	Number of Participants
HBTI, Kanpur	4
Aligarh Muslim University	2
MMMEC, Gorakhpur	3
NIT, Raipur	1
BTKIT, Dwarhat	4
G.B. Pant, Pauri Grahwal	4
G.J. University of Science and Technology	2
MJP, Rohilkhand	2
FTM, Moradabad	4
Jadavpur University	2
B.E college, Shibpur	3
UIET, Kurukshtra	3
NIT, Kurukshetra	2
NCE, Panipat	2
UIET, Punjab University, Chandigarh	2
MNIT, Allahabad	7
G.B. Pant, Pantnagar	5

SCHEDULE OF THE WORKSHOP

- October 05, 2013

Time	Event
8:30AM – 9:00AM	Inauguration
9:00AM – 10:00AM	Dr. K. Muralidhar (IIT Kanpur) Flow and transport in porous media with applications
10:00AM – 11:00AM	Dr. Mahesh Tirumkudulu (IIT Bombay) Dynamics of a radially expanding liquid sheet
11:00AM – 11:30AM	Coffee Break
11:30AM – 12:30PM	Dr. Arghya Deb (IIT Kharagpur) Effect of specimen size on strength in concrete under axial compression

Time	Event
12:30PM – 1:30PM	Dr. P. Chandramouli (IIT Madras) Non-linear dynamics of non-smooth systems using smoothing schemes
1:30PM – 2:30PM	Lunch Break
2:30PM – 3:30PM	Dr. Anindya Chatterjee (IIT Kanpur) Teaching of rotations, Euler angles, and angular velocity
3:30PM – 4:00PM	Posters and Coffee
4:00PM – 5:00PM	Dr. S. Mahesh (IIT Madras) Polycrystal plasticity models with grain interaction
5:00PM – 6:00PM	Dr. Vikranth Racherla (IIT Kharagpur) Non-associated flow models and effects on macroscopic failure mechanisms
6:00PM – 7:30PM	Informal Poster Session

- October 06, 2013

Time	Event
9:00AM – 10:00AM	Dr. Vijay Patel (DRDO) Challenges in flight control design, development and testing
10:00AM – 11:00AM	Dr. Amit Agrawal (IIT Bombay) Gas flow in complex microchannels
11:00AM – 11:30AM	Coffee Break
11:30AM – 12:30PM	Dr. C. Venkatesan (IIT Kanpur) Aeroelastic model for prediction of blade loads, blade response and vehicle response of a helicopter in general maneuver
12:30PM – 1:30PM	Dr. C. S. Manohar (IISc Bangalore) Research into stochastic structural dynamic testing
1:30PM – 2:30PM	Lunch Break
2:30PM – 3:30PM	Dr. P. Mohite (IIT Kanpur) Mechanics of fibrous composites: Teaching, research, and new directions
3:30PM – 4:00PM	Posters and Coffee
4:00PM – 5:00PM	Dr. V. Shankar (IIT Kanpur) Instability and transition in flow through deformable tubes and channels
5:00PM – 6:00PM	Dr. Anurag Gupta (IIT Kanpur) Dealing with stress
6:00PM – 7:30PM	Informal Poster Session

- October 07, 2013

Time	Event
9:00AM – 10:00AM	Dr. Madhusudan Venkadesan (NCBS Bangalore) Optimal strategies for throwing fast

Time	Event
10:00AM – 11:00AM	Dr. C. S. Upadhyay (IIT Kanpur) From finite elements to a virtual experimentation station for damaging composites
11:00AM – 11:30AM	Coffee Break
11:30AM – 12:30PM	Dr. G. Ananthasuresh (IISc Bangalore) Non-dimensionality in mechanics of slender elastic bodies
12:30PM – 1:00PM	Dr. Naveen Tiwari (IIT Kanpur) Understanding Reynolds transport theorem
1:00PM – 1:30PM	Closure: Add. Sec. Higher Education (MHRD) and Director, IITK
1:30PM – 2:30PM	Lunch

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Summary of Faculty Feedback

TEQIP Knowledge Incubation Centre

5-7/10/2013

Total attendance- 23

Workshop

Questions	Excellent	Good	Ordinary
Clarity of communication about workshop	07	12	04
Organization of the sessions	08	14	01
Quality of lectures	17	05	01
Quality of posters	01	13	09
Effectiveness of discussions	07	15	02
Effectiveness of learning experience	08	13	02
	Appropriate	Short	long
Duration of workshop	19	04	00
	Definitely	Maybe	No
Would you like to have more such sessions?	18	05	00
Would you like e-lectures by experts on special topics?	20	03	00
Suggest specific topic that you would like additional expert lectures on	<ul style="list-style-type: none">• Fluid Mech.• System Engineering• Water treatment• Molecular dynamics simulation• Impact and blast• Production Engg, Industrial Engg• Dynamic fracture mechanics• Elasto plastic formulation		
Additional Suggestions	<ul style="list-style-type: none">• All speakers were from IIT/IISc Some talks could have been from NIT/universities• Facilities should be made next time for transportation of students of local colleges.• Schedule of workshop should be given at the arrival of the participants		

Teaching

Which subjects do you teach?	<ul style="list-style-type: none"> • Fluid Mech. • Signals and systems Digital signal process • Industrial pollution control • Water resources and open channel • Mechanics of solids, structural dynamics • Fertilizer technology, petroleum refining 			
What is average student to teacher ratio in your institute?	<ul style="list-style-type: none"> • 20:1 • 18:1 • 10:1 • 15:1 • 20:1 • 90:1 			
Questions	YES		NO	
Do you have additional support for teaching (tutors, graders, teaching Assisttants, etc)?	10		13	
Do you give class projects for UG classes?	16		07	
Do you give class projects for PG classes?	15		8	
Do you have sufficient resources for laboratory courses?	10		13	
	Sufficient		Inadequate	
Is the library/journal/e-connection support adequate?	03		20	
	Definitely	May be	No	
Would you like to have common (TEQIP) repository of course material?	20	03	00	
Would you like to visit IITK to participate in and develop course material (existing or new)	17	05	01	
Would you like to participate in creation of the repository material (course files/lab. Manuals/question bank/etc)	16	05	02	
	e-courses	Workshops	Content	none
How can IITK effectively help you prepare for teaching?	05	08	05	05
How can TEQIP help improve your teaching?	<ul style="list-style-type: none"> • Providing latest information accessibility to the topics of teaching • TEQIP alone can never help • Long duration specific topic workshop • Knowledge upgrading through workshop 			

Research

Questions	Definitely	Maybe	No
Would you like to visit an IIT for a visiting-faculty/post-doctoral fellow ,if offered(via TEQIP)?	18	04	01
Would you like to share/use research infrastructure at IITK, if made available?	22	01	00
Would you like to conduct collaborative research with IITK?	21	02	00
Would you like lectures by experts (Indian and international) on niche research areas/topics?	22	01	00
Do you want special-topic conferences?	19	04	00
Should IIT faculty visit your institute for short lectures/seminars/research collaboration	22	01	00
How can TEQIP help improve your research?	<ul style="list-style-type: none"> • Funding for labs., infrastructure , R&D projects • Opportunity to work in international collaboration research • By facilitating tie-up with professor/scientists/industry people of one area of interest • By collaborating with other colleges in TEQIP circle • If possible, the workshops/symposiums/short term courses can be designed to cover the specific areas, starting from basics to advanced state of art. 		

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Summary of Student Feedback

TEQIP Knowledge Incubation Centre

5-7/10/2013

Total attendance- 16

Workshop

Questions	Excellent	Good	Ordinary
Clarity of communication about workshop	05	10	01
Organization of the sessions	07	08	01
Quality of lectures	13	02	01
Quality of posters	05	09	02
Effectiveness of discussions	04	10	02
Effectiveness of learning experience	06	08	02
	Appropriate	Short	long
Duration of workshop	16	00	00
	Definitely	Maybe	No
Would you like to have more such sessions?	12	04	00
Would you like e-lectures by experts on special topics?	16	00	00
Suggest specific topic that you would like additional expert lectures on	<ul style="list-style-type: none">• Structural Dynamics• Setting equipments, which may be used in water purification process• Thermal behavior• Challenges in high control design• Nano composites, Aero elasticity• Fracture Mechanics, FEM		
Additional Suggestions	<ul style="list-style-type: none">• All speakers were from IIT/IISc Some talks could have been from NIT/universities• Arrangements should be made next time for transportation of students of local colleges.• Schedule of workshop should be given at the arrival of the participants		

Learning

Questions	Yes	No	
Do you get enough class projects?	13	03	
Is the learning adequate?	13	03	
Do you have sufficient resources for laboratory courses?	07	09	
What is your area of specialization	<ul style="list-style-type: none"> • Composite(Metal Material) • Applied geology • Oil technology • Dynamic (civil engg.) • Environmental • Thermal 		
	Sufficient	inadequate	
Is the library/journal support/e-connection adequate?	10	06	
	Definitely	Maybe	No
Would you like to have common (TEQIP) repository of course material?	15	01	00
Would you like to visit IITK to attend specialized courses?	14	02	00
Would you like MOOCS/e-resources based courses?	13	03	00
Would you like IITK faculty/other experts to visit your institute for lecture series, research and other collaboration?	16	00	00
How can TEQIP help improve your learning?	<ul style="list-style-type: none"> • Expose the ideas of new field of research • By arranging similar workshop in our college too • It gives a vast area of research ,and a new way approaching to difficulties • By the interaction of various researchers with experts at IIT's and facilities available there to get a moral & technical lift • By using Research facilities of IIT campus 		

Research

Questions	Definitely	Maybe	No
Would you like to visit an IIT for a short visit /internship/post-doctoral stint ,if offered(via TEQIP)?	14	02	00
Would you like to share/use research infrastructure at IITK, if made available?	15	01	00
Would you like to conduct collaborative research with IITK faculty?	12	04	00
Would you like lectures by experts (Indian and international) on niche research areas/topics?	14	02	00
Do you want special-topic conferences?	14	02	00
How can TEQIP help improve your research?	<ul style="list-style-type: none"> • By providing us with a platform to perform well and all the technical help • If something is made available quickly, it can make my research easier to complete • By the interaction of various researchers with experts at IIT's and facilities available there to get a moral and technical lift. • By using research facilities of IIT Kanpur • TEQIP can form a community through website where students are ask their problem and can get their annular 		

OUTCOME

The participants were introduced to the teaching methods in various fields in Applied mechanics, current research activities and other facilities available at IIT Kanpur. The workshop also focused on discussing effective pedagogy, augmentation of laboratory facilities and research directions. The main goal of the workshop was to promote interdisciplinary conversation and informal faculty mentoring, while providing all faculty with opportunities to hone and expand their teaching.