Probabilistic Analysis of Power Plants and Design of Metamaterial-based Shields for Enhanced Performance

Overview

The tremendous impact of natural hazards, such as earthquakes, tsunamis, flooding, etc, which triggered technological accidents, referred to as natural-technological (NaTech) events, was demonstrated by: i) the recent Tohoku earthquake and the following Fukushima disaster in 2011 (Nakashima et al., 2014) ; ii) the UK's 2015 winter floods which topped £5bn, with thousands of families and businesses that faced financial problems because of inadequate or non-existent insurance. The NaTech problem is quite relevant as up to 10% of industrial accidents, involving the release of Chemical, Biological, Radiological, Nuclear and high-yield Explosives (CBRNE) substances, were triggered by natural hazards (Campedel, 2008) . Although the number of lives lost each year to natural disaster is reduced, the recovery costs of major disasters continue to rise (OSTP, 2008) . In fact, each year, NaTech disasters cause an estimated $52 billion in damages in the United States in terms of life lost, disruption of commerce, properties destroyed, and the costs of mobilizing emergency response personnel and equipment. Similar figures apply to Europe. In this context, we intend to grow experts that combine a robust academic foundation in reliability/resilience with practical experiences, technological expertise with awareness of the socio-economical context and conviction to furthering research/applications with an entrepreneurial spirit. Hence, this course wants to offer innovative research/practical training ground in risk-based simulation/development of "special risk" petrochemical plants, vibration reduction and community disaster resilience subjected to earthquakes, blast, fire, etc. More precisely, we'll provide training-through-research/examples in: i) controlling resilience planning at the plant level and nearby built environment; ii) designing metamaterial-based vibration shields; iii) quantifying resilience for facility/community performance during and after a hazard event; iv) setting concepts of recovery and functionality.

Nakashima, M., Lavan, O., Kurata, M., Luo, Y., (2014), Earthquake Engineering Research Needs in Light of Lessons Learned from the 2011 Tohoku Earthquake, Earthquake Engineering and Engineering Vibration, 13, pp. 141-149.

Campedel, M. (2008), Analysis of Major Industrial Accidents Triggered by Natural Events Reported in the Principal Available Chemical Accident Databases, Report EUR 23391 EN - 2008, JRC42281, Ispra, Italy.

OSTP (2008) Grand Challenges for Disaster Reduction, National Science and Technology Council, Committee on Environment and Natural Resources, A Report of the Subcommittee on Disaster Reduction, June 2005, Second Printing Jan 2008, Executive Office of the President, Office of Science and Technology Policy, Washington D.C. http://www.sdr.gov/SDRGrandChallengesforDisasterReduction.pdf

European Parliament, (2012),Directive 2012/18/EU (Seveso II) on the Control of Major Accident Hazards Involving Dangerous Substances, Amending and Subsequently Repealing Council Directive 96/82/EC, Official Journal, L197/2, 24/7/2012, 1-37.

Course duration	**22nd April 2019 to 26th April 2019** **Number of participants for the course will be limited to thirty.**
You Should Attend If…	▪ you are an applied mechanical engineer or researcher interested in enhancing the performance of process plants also using metamaterials. ▪ you are a mechanical/civil engineer or research scientist interested in applying metamaterials for your theoretical or experimental studies on structural vibration. ▪ you are an earthquake structural designer, researcher or scientist interested in designing of structures for safety. ▪ you are a student or faculty member from an academic institution and are interested in learning more about metamaterials and probabilistic design of power plants.
Fees	The participation fees for taking the course are as follows: **Participants from abroad :** **US $ 500** **Industry/ Research Organizations within India: `** **Rs. 10000** **Faculty/Staff from Academic Institutions within India:** **Rs. 5000** **Students from India:** **Ph.D./Post-doctoral** **Rs. 2000/3000** **M.Tech./M.Sc.** **Rs. 1000** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. Boarding, lodging and meal charges are not included in the fees. The participants will be provided with accommodation on a payment basis.

The Faculty

Prof. Oreste S. Bursi is Professor in Structural Dynamics and Control at the Department of Civil, Environmental and Mechanical Engineering, University of Trento, in Italy. His research interests include Structural dynamics, control, Pseudo-dynamic testing, Modelling, Experimentation, Applied research, Metamaterials, Piping systems, Process plants. He is the Head of the Research Group Hazard Mitigation, Structural Dynamics and Control (HMSDC).

Dr. Anil Kumar is an Assistant Professor of Indian Institute of Technology, Roorkee. His research interest includes: Design of vibration mitigation systems, piping systems, pedestrian induced vibration of structures, Magnetorheological dampers for rail vehicle suspension, Elastomer based dampers for shock absorption.

- **Prof. Yogendra Singh** is Professor of Indian Institute of Technology, Roorkee. His research interest includes: Performance Based Seismic Design, Performance Based Design of Buildings and Bridges, Seismic Response Evaluation of Structures, Non-Linear Modelling and Analysis of RC Structures, Seismic Evaluation and Retrofitting of Structures, Seismic Evaluation and Retrofit of Hospitals and Schools, Seismic Vulnerability and Risk Evaluation, Seismic Vulnerability ans Risk Analysis of Indian Housing Stock Dynamic Soil-Structure Interaction, Effect of Soil on Seismic Performance of Buildings, Towers, and Bridges, Seismic Risk In Hilly Areas, Sesimic Fragility Analysis of Hill Buildings, Seismic Risk In Hilly Areas, Slope-Building Interaction under Seismic Action

Course Co-ordinators

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http://www.gian.iitkgp.ac.in/GREGN

http://me.unitn.it/oreste-bursi

PAYMENT of COURSE FEE AND ACCOMODATION REQUEST FORM
(To reach electronically by 8th April, 2019)

Probabilistic Analysis of Power Plants and Design of Metamaterial-based Shields for Enhanced Performance

April 22-April 26, 2019
Department of Mechanical & Industrial Engineering
Indian Institute of Technology Roorkee
Roorkee, Uttarakhand

After Completion, please e-mail to: **Dr. Anil Kumar** **Department of Mechanical & Ind. Engg.** **Indian Institute of Technology Roorkee** **Uttarakhand-247667, India** Phone: +91-1332285105 (O) +91-1332285061 (R), +91-8449149183 Preferable e-mail: kumara.iitr@gmail.com Alternate e-mail : anikrfme@iitr.ac.in	**Affix passport size photograph**

1. Name of applicant (in block letters): Ms./Mr. /Dr. ……..…....
2. Status (Mark anyone): Student……., Not a student……..
   (a) If a Student:
   Academic program under which registered currently……
   Date since when registered……
   Name of Academic/ Research Institution……..……

   (b) If not a Student
   Nature of employment (Teaching, Research, Govt. service, NGO, Industry)……..
   Organization where employed……
   Employed since……..…..
   Designation……...
   Academic qualifications……
3. Full Postal Address for Communication:

4. E-mail id:
5. Phone numbers: Mobile……., Landline……..
6. Each candidate is requested to complete the following points.

(I) BOARDING AND LODGING:

Are you willing to arrange your boarding and lodging yourself? (**Yes/No**)

*If **No**, then mention the dates for arrival and departure. Also, give your priority choice for following available hostels in the table below.*

(i) Date of Arrival: ……., (ii) Date of Departure: …….

Hostel	**Room rent (per day)**	**Meal Approx. cost (per day, per person)**
1. N. C. Nigam hostel (AC)	₹ 1000/-	₹ 394/-
2. KIH (AC)	₹ 750/-	₹ 336/-
3. Trainee officers hostel (AC)	₹ 750/-	₹ 281/-
4. Trainee officers hostel (Suite)	₹ 1000/-	₹ 281/-
5. Student's Hostel per person (Non-AC)	₹ 100/-	₹ 130/-

(iii) Priority choice for available hostel.

S.No.	Name of Hostel	No. of Persons	No. of Rooms	Single/Sharing
1.				
2.				
3.				
4.				
5.				

Note:

(i) Those who are coming with family can stay only in N.C. Nigam, KIH and Trainee officers hostel based on the availability of rooms.

(ii) Above room rents and meal costs are tentative. For sharing of rooms cost will be shared.

(II) REGISTRATION:

For registration each candidate is asked to send a required demand draft (based on his/her appropriate status as defined in point (2)) in favor of Conference, Seminar & Symposium, IIT ROORKEE, (Acc. No. 33136732957, Branch code 1069). Name of the Bank: STATE BANK OF INDIA, Branch office: Indian Institute of Technology Roorkee, 247667. IFSC CODE: SBIN0001069. GST No. 05AAAL10033R125.

Candidate can also deposit required registration fee online in above account. However, they have to forward the transaction document in the following email id: kumara.iitr@gmail.com

Demand Draft No. / Online transaction number	

Note:

(i) Soft copy of this application should be sent by e-mail latest by 8th March, 2019. Those who are unable to e-mail can send the hard copy of their applications at above mentioned address latest by 8th March, 2019.

(ii) The seats are limited and will be filled generally on the first come first serve basis. Decision of the course coordinator will be final in this regard. Once we receive the soft copy of this filled form, a confirmation e-mail will be sent.

(iii) Please start your travel to Roorkee to attend the course only if you have received an e-mail confirmation. To confirm your status as per point (2), bring a valid ID.

Date: **Signature of applicant**