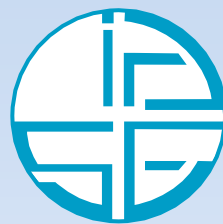


International Seminar on Performance Based Design of Buildings & Bridges for Enhanced Seismic Resilience

8 – 9 November 2019 | PHD HOUSE, New Delhi



Organized by



**Indian Association of Structural Engineers
(IAStructE)**

Supported by



Structural Engineers Association of
Northern California (SEAONC)

About the Seminar

The present society is faced with multi-faceted challenges in a built environment as well as for new construction. With the population expanding earth's limited resources have to be spread thin to meet everyone's building requirement. To achieve optimized solutions Structural/Civil Engineers needs to go in for advanced engineering analysis broadly called Non-Linear analysis or **Performance Based Design (PBD)** as against the commonly used in the industry & taught in academic Institutions the conventional Linear Analysis.

Engineers have long felt that there is hidden strength of structures, as many of them survive nature's vagaries despite not being designed so. This is on account of the non-linear behaviour of structures which is currently approximated with the linear analysis as the former requires high computing time. However, with faster computers available to the society, it now expects to have explicit views about this hidden strength for various reasons.

These requirements of the society may stem from the need not to spend too much for a retrofit or be saved from heavy disruption it may cause, if it can be shown from the non-linear analysis that the structure is compliant or that it can take a far more severe earthquake than intended as per the Code, such as proving that an existing building is safe in zone V rather than Zone IV of the seismic zoning map of India. However it may need necessary regulations.

About IAStructE

Indian Association of Structural Engineers (IAStructE) is national apex body of structural engineers in India established with the objective to cater to the overall professional needs of structural engineers. The Association has become the source of expertise and information concerning all issues that involve structural engineering and public safety within the built environment. It has no commercial objective. IAStructE has signed MoU with Institution of Structural Engineers (IStructE) of UK, Japan Society of Seismic Isolation (JSSI), The Institution of Civil Engineers (ICE) of UK and Structural Engineers Association of Northern California (SEAONC) for exchange of information and promotion of Structural Engineering profession.

IAStructE is purely a professional learned society with the prime objective of supporting and protecting the profession of structural engineering by upholding professional standards and acting as a mouthpiece for structural engineers in India.

IAStructE endeavors to ensure that it's members develop the necessary skill in structural engineering and work to the highest standards by maintaining a commitment to professional ethics and standards within structural engineering.

This requirement may also stem from user's requirement to assess the actual probability of collapse as is often the case for the insurance sector & other informed sections of the society. It may also highlight the positive aspects of using vibration control devices (such as dampers & base isolation) by quantifying benefits of enhanced-post-earthquake resilience.

An overall picture targeted at all stake holders shall be presented. Also, some of the detailed tools for performing the high end non-linear analysis such as Static Non-linear Procedure (pushover analysis), Non-Linear Dynamic Analysis, Incremental Dynamic Analysis & creation/ use of Fragility Curves will be discussed along with case studies.

The seminar provides a unique opportunity for all delegates not only to gain knowledge by listening to the International Experts on this relatively new topic, but also benefit from interacting with them & to use this business opportunity for addressing various issues of their current projects.

There are important take-aways for all stakeholders in the Construction Industry—Engineers, Architects, Builders, Developers, Govt. & Private Departments.

IAStructE strives for continued technical excellence; advancing safety and innovation across the built environment. It also strives to make available to the Government, Public Sector and Private Sector - a credible source of well qualified and experienced Structural Engineers. A nationwide database of Structural Engineers has been compiled and is being constantly updated.

The Association provides opportunity for all the members to develop skills in Structural Engineering and helps members to be at the forefront of Structural Engineering practice. Towards achievement of its aims and objectives, IAStructE is engaged in organizing the following:

- CPD Courses for Professionals
- Student's orientation program
- Technical Lectures and Technical Discussions
- Refresher Courses for young engineers
- Seminars/Workshops

IAStructE is currently operating from four regional / state centres. These regional centres are located in the Eastern, Western, Northern and Southern parts of the country residing/practicing all over the country.

INVITED SPEAKERS



Prof. Amit Kanvinde (*HOD Civil Engineering University Of California at Davis*) San Francisco, Member SEAONC
Amit Kanvinde is Professor and Chair of Civil and Environmental Engineering at the University of California, Davis. Amit is interested in the seismic response of steel buildings, with an emphasis on understanding, simulating, and designing for extreme limit states. He is active on various professional and code committees in the United States, and is the recipient of several awards from the American Institute of Steel Construction, the American Society of Civil Engineers, and the Earthquake Engineering Research Institute. He received his bachelors from IIT Bombay, and his Masters and PhD from Stanford University.

Ms. Rupa Garai, *Associate Director, Skidmore Owings & Merrill, San Francisco, Member SEAONC*

Ms. Rupa Garai has over 17 years of experience as Structural Engineer contributing to projects that include mixed-use, commercial, airports, courthouses, high-rise residential, and office tower projects. Rupa teaches collaborative design studios at Stanford University where she also received a Master degree in Structural Engineering. She has led numerous projects that incorporates Performance-based seismic design approaches. She was the lead project engineer on office tower projects and courthouses like 95 State, 222 South Main, San Bernardino Courthouse, and San Diego Courthouse. Her international portfolio includes projects in China and India like Poly International Plaza and Mumbai International Airport.



Dr. Anirudh Rao, (*PhD. Stanford*), *Practicing Structural Engineer Milan Italy, Member SEAONC*

Dr, Anirudh is a Seismic Risk Modeller at the Global Earthquake Model (GEM) Foundation in Pavia, Italy. Anirudh obtained his BTech (2008) in Civil Engineering at IIT-Bombay. He earned his MS & PhD in Structural Engineering, with a special focus on Earthquake Engineering at Stanford University. His graduate research work at the John A. Blume Earthquake Engineering Center at Stanford focused on the development of a methodology for the time-dependent seismic risk assessment of ageing infrastructure elements subject to long-term deterioration processes like corrosion. As part of the seismic risk engineering team at the GEM Secretariat in Pavia, his current role entails creating both probabilistic and scenario - based seismic risk models and implementing them within the Open Quake engine (GEM's open- source software for seismic hazard and risk calculations).

Dr. Yogendra Singh, *Railway Bridge Chair Professor, Department of Earthquake Engineering, IIT Roorkee*

He has research interests in Performance Based Design of Buildings and Bridges; Seismic Vulnerability and Risk Evaluation; Non-Linear Modelling and Analysis; and Seismic Evaluation and Retrofitting of Structures. He has 24 years of research and teaching experience, guided 12 Ph.Ds., published 60 research articles in refereed journals and presented more than 100 papers in national and international conferences. He has been member of several expert teams on seismic safety and is convener of the BIS expert group on Performance Based Seismic Design of Structures.



Dr. Demin FENG, *Chief Researcher, Fujita Corporation, Japan*

Dr. Feng has been working in Fujita since 1992 after he received his Ph.D from Tokyo Metropolitan University. He has been engaged in research and development of seismic isolation and energy dissipation technology and input ground motions. Fujita Corp. is an international construction company based at Japan, belonging to Daiwa House Group, which is a Fortune 500 company. The company was founded in 1910, now has 3050 employees around world. In fiscal 2018, the company's net sales recorded over 4.5 billion US dollars. Fujita Corp. has constructed 140 seismic isolation buildings and 70 energy dissipation buildings. The company designed and constructed a 60-story Precast RC residential building at Tokyo in 2017.

Dr. Dipti Ranjan Sahoo, *Associate Professor, Department of Civil Engineering, IIT Delhi*

Dr. Sahoo received his Ph.D. in Civil Engineering from IIT Kanpur. He was a Postdoctoral Fellow at the University of Texas at Arlington, USA during 2008-2010. His research interests are Seismic design and behaviour of steel structures, Passive vibration control and performance-based seismic design. He is recipient of the Young Engineer Award from the Indian National Academy of Engineering (INAE), the Institution of Engineers (India), Department of Atomic Energy, and Department of Science and Technology. He has guided six PhD theses and over 100 Masters and Bachelors Projects. Currently, he is supervising 12 PhD students. He has published nearly 200 research articles in the reputed International Journals and conferences.



Mr. Vipul Ahuja, *Licensed Structural Engineer, California, Director, Ahuja Consultants Pvt Ltd. New Delhi/ NCR*

He has vast experience in the field of structural / earthquake engineering. His most recent state-of-the-art technology experience is in engineering of Performance Based Design, base-isolation and damper applications in high-rise buildings (Steel Composite & Concrete). He has designed a base isolated commercial (One Million sqft.) building in Gurugram for Ireo. He has designed hundreds of buildings of residential (like 55 storey residential building in Gurugram), commercial and retail spaces (like Emaar commercial Tower Gurugram, Zinc mall in Greater Noida), hospitals (like RML & GTB), long span roofs (like Khel Gaon Indoor Stadium, New Delhi), bridges, shell roofs (SSS NIRE, Jalandhar), long span prestress concrete structures (USA & Australia). In the USA (14 Years), he has worked with many prestigious firms like Skidmore Owings and Merill and in India (25 years), he has lead his own firm. He has experience using current Indian and International codes (like USA, Australian, Japanese and European standards) and has several technical papers to his credit.

ADVISORY COMMITTEE

| | |
|----------------------------|---|
| Prof. Mahesh Tandon | <i>Chairman, Past President IAStructE and MD - Tandon Consultants Pvt Ltd</i> |
| Mr. Mahendra Raj | <i>Founder President IAStructE, MD - Mahendra Raj Consultants Pvt Ltd</i> |
| Mr. S. Ghosh | <i>Past President IAStructE, Former Director (Emeritus) CES(I) Pvt Ltd</i> |
| Mr. S. C. Mehrotra | <i>Past President IAStructE, Advisor - Mehro Consultants</i> |
| Dr. D. K. Paul | <i>Former Professor & Emeritus Fellow, Dept. of Earthquake Engg., IIT Roorkee</i> |
| Dr. C. V. R. Murty | <i>Professor, IIT Madras</i> |
| Mr. Sanjay Pant | <i>Director & Head Civil Engineering, Bureau of Indian Standards</i> |

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| Mr. Rajiv Ahuja | <i>GC member IAStructE, Independent Consultant (Highway & Bridges)</i> |
| Mr. Bhavin Shah | <i>Chairman Gujarat State Centre IAStructE, CEO, VMS Engg. & Design Services (P) Ltd</i> |
| Mr. Aman Deep Garg | <i>Member IAStructE, Director – Creative Design Consultats & Engineers Pvt Ltd</i> |
| Mr. S. Arun Kumar | <i>Scientist 'D', CED - Bureau of Indian Standards</i> |
| Dr. Shilpa Pal | <i>GC member IAStructE & Associate Professor, Civil Engg. Department, DTU</i> |
| Mr. Mohit Dhiman | <i>Structural Engineer, Engineering Creations</i> |

TECHNICAL COMMITTEE

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| Dr. Dulal Goldar | <i>GC member IAStructE, Principal (Retd.), Delhi College of Engineering</i> |
| Ms. Sangeeta Wij | <i>GC member IAStructE, Managing Partner, SD Engineering Consultants LLP</i> |
| Dr. Abhay Gupta | <i>GC member IAStructE, Director, Skeleton Consultants Pvt. Ltd.</i> |
| Prof. Yogendra Singh | <i>Professor, Railway Bridge Chair, EQ Engg. Department, IIT Roorkee</i> |
| Prof. Amit Kanvinde | <i>HOD Civil Engr. University of California at Davis, USA (Member SEAONC)</i> |
| Prof. Vasant Matsagar | <i>Dogra Chair Professor (Structural Engg.), IIT Delhi</i> |
| Mr. Arvind Gupta | <i>Fellow IAStructE, Proprietor, Arvind Gupta Consultants</i> |
| Dr. D. R. Sahoo | <i>Associate Professor, CED IIT Delhi</i> |

PROGRAM

DAY I : 08 NOVEMBER 2019

DELEGATES REGISTRATION (08:30 Hrs to 9:30 Hrs)

INAUGURAL SESSION (9:30 Hrs to 10:30 Hrs) (60 mins)

Chief Guest & Keynote Address – TBD

TEA: 10:30 Hrs to 11:00 Hrs

Technical Session 1
11:00 Hrs to 13:50 Hrs

Theme : Introduction & Basis of PBD

Session Chair – Opening Remarks (10 Mins)

**Overview of Performance Based design of Buildings & Bridges
(Innovations for Economical Design, Retrofitting & Vibration Control—Base
Isolation & Dampers)**

Mr. Vipul Ahuja, Vice President (North) IAStructE & CEO & Director, Ahuja Consultants P Ltd. (45 Min)

Hazard Quantification, Ground Motion Selection and Scaling

Prof. Amit Kanvinde, HOD Civil Engr. University of California at Davis, USA (45 Min)

**Tall Building Guidelines/LA Tall building - Research review and application
to Practice including Case Study with Damping Devices (Part I)**

Ms. Rupa Garai, Associate Director, Skidmore Owings & Merrill, San Francisco, CA, USA. (45 min)

Presentation by Sponsor (15 Min)

QA - 10 Min

LUNCH: 13:50 Hrs to 14:25 Hrs

Technical Session 2
14:25 Hrs to 16:30 Hrs

Theme : PBD in Composite Structures & EQ Resilience

Session Chair – Opening Remarks (10 Mins)

**Nonlinear Response Simulation, Steel & Composite Steel/ concrete Buildings
& Bridges (Part I)**

Prof. Amit Kanvinde, HOD Civil Engr. University of California at Davis, USA (45 Min)

**Risk and resilience of building & bridges separately and for regions-including
applications for seismic Isolation using PACT (FEMA), GEMS & REDi(Part I)**

Dr. Anirudh Rao, Earthquake Risk Analyst at GEM Foundation, Pavia, Lombardy, Italy (45 min)

Presentation by Sponsor (15 Min)

QA - 10 minutes

TEA: 16:30 Hrs to 16:55 Hrs

Technical Session 3
16:55 Hrs to 18:00 Hrs

Theme: Applications of PBD Shear Walls & Flat Slabs

Session Chair – Opening Remarks (10 Mins)

**Performance Based Design Applications for typical Indian Highrise Buildings
with Shear Walls/ Flat-slabs and Bridges.**

Dr. Yogendra Singh, Professor, Railway Bridge Chair, EQ Engg. Department, IIT Roorkee (45 Min)

QA - 10 Min

END OF DAY ONE

DAY II : 09 NOVEMBER 2019

Technical Session 4
09:30 Hrs to 11:45 Hrs

Theme: PBD in Steel & Composite Structures & Resilience due to Vibration Control
Session Chair – Opening Remarks (10 Mins)

Nonlinear Response Simulation Composite Steel/ concrete Buildings & Bridges (Part 2)

Prof. Amit Kanvinde, HOD Civil Engr. University of California at Davis, USA (45 Min)

Risk and resilience of building & bridges separately and for regions-including applications for Vibration Control using PACT(FEMA),GEMS & REDi(Part2)

Dr. Anirudh Rao, Earthquake Risk Analyst at GEM Foundation, Pavia, Lombardy, Italy (45 Min)

Presentation by Sponsor (15 Min)

QA - 10 Min

TEA: 11:35 Hrs to 11:50 Hrs

Technical Session 5
11:50 Hrs to 13:55 Hrs

Theme : PBD in RCC Shear wall Highrise & Dampers in Buildings & Bridges
Session Chair – Opening Remarks (10 Mins)

Performance Based Design Case Study for Reinforced concrete Highrise shear wall structure - Tower 8, Transbay Block 9, 111 Main, San Francisco.

Ms. Rupa Garai, Associate Director, Skidmore Owings & Merrill, San Francisco, CA, USA. (45 Min)

Performance Based Design applications to Buckling Restrained Braces in The Indian Environment—including retrofit & new construction

Prof. D. R. Sahoo, Associate Professor, Structural Engineering, IIT Delhi (45 Min)

Presentation by Sponsor (15 Min)

QA - 10 Min

LUNCH: 13:55 Hrs to 14:40 Hrs

Technical Session 6
14:40 Hrs to 16:45 Hrs

Theme: PBD in future Codes with & without Vibration Control
Session Chair – Opening Remarks (10 Mins)

Non-linear analysis application for Structures with Vibration Control Devices--Base Isolators & Dampers Case Studies

Dr. Demin FENG, Chief Researcher, Fujita Corporation, Japan (45 Min)

Future Direction of Indian Codes based on Performance Based Design including Vibration Controlled Devices

Dr. Yogendra Singh, Professor, Railway Bridge Chair, EQ Engg. Department, IIT Roorkee (45 Min)

Presentation by Sponsor (15 Min)

QA - 10 Min

Concluding Session & Report 16:45 Hrs to 17:30 Hrs

TEA: 17:30 Hrs onwards

Who Should Attend

- Structural Engineers
- Architects
- Consultants and Designers
- Urban Planners
- Contractors and Builders
- Promoters and Developers
- Academicians and Students
- Government Departments, PSUs
- Financiers and Funding Agencies
- Equipment System Suppliers
- Applicators
- Civil Society
- Project Management Consultants

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(Delegate fee includes registration, kit, seminar literature, lunch and tea)

- IAStructE/CEAI Members - INR 10000/- + 18% GST
 - Others - INR 12000/- + 18% GST
 - Students of Engineering Colleges and Institutions - INR 6000/- + 18% GST
 - Foreign Delegates - 250 USD + 18% GST
- **Early Bird Discount of 20% is available till 15th October 2019**

MODE OF PAYMENT

- Cheque/ DD drawn in favor of **“Indian Association of Structural Engineers”**
- Bank Transfer (See Registration Form)

REGISTRATION FORM

**International Seminar on
Performance Based Design of Buildings & Bridges for Enhanced Seismic Resilience**
08 – 09 November 2019

Venue: LPS Auditorium, PHD Chamber of Commerce & Industry
PHD House, 4/2 Siri Institutional Area, August Kranti Marg, New Delhi | 110016.

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For more information please contact:

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