ISSMGE FOUNDATION
REPORT ON CONFERENCE ATTENDANCE

Your Name:	***Your Organization:***	***Date of report:***
Chaidul Haque Chaudhuri	Indian Institute of Technology Bombay	13-10-2021
Conference Title: 17th World Conference on Earthquake Engineering (17WCEE)	***Location of Conference:*** Sendai, Japan	***Dates of Conference:*** September 27 to October 2, 2021

What you learned:

The participation in 17th World Conference on Earthquake Engineering (17WCEE), 2020-21, conference gave me an opportunity to get exposure to ongoing research activities in the field of soil mechanics, earthquake engineering, and structural engineering. Although due to COVID Pandemic it was not able to an in person interaction but even in virtual mode I had able to interact with academicians and practicing engineers from various countries and leading researchers and stalwarts in the field of engineering and gain an insight into their on-going research activities. The discussions with the experts through online comment box were very fruitful and it helped me to broaden my knowledge and deepen my understandings of the subject. Moreover, I also received valuable research inputs from researchers working in the similar area of geotechnical earthquake engineering. In the conference, I have made many friends with researchers from different countries which will help me significantly in the near future in exchange of valuable ideas and thereby leading to possible research collaborations.

People you met:

The conference provided me an opportunity to interact with academicians and practicing engineers from various countries and leading researchers and stalwarts in the field of geotechnical and structural engineering through online mode. Some of them are given below:

- Prof. Tsuyoshi Takada, School of Engineering of the University of Tokyo, Japan.
- Prof. Y. Xiao, Distinguished Professor, Zhejiang University, China.
- Prof. K. Irikura, Adjunct Professor, Aichi Institute of Technology.
- Prof. T. Kijewski-Correa, University of Notre Dame, Notre Dame, IN, USA.
- Mr. Khalid Bashir, Senior Research Scholar, IIT Roorkee.

Main features of conference:

The 17th World Conference on Earthquake Engineering 2020-21, was held on September 27

to October 2 in 2021 in Sendai, Japan through hybrid mode (both online and in person). The conference covered several topics from geotechnical and structural engineering such as liquefaction, slope failure, soil-structure interaction, underground structures, foundations, seismic response of bridges and other structures, earthquake studies etc. The conference had parallel sessions which includes several keynote lectures, oral presentation, poster presentation and short presentation (SOP). As the conference was in hybrid mode so maximum presentations are available in the website with the audio of the speakers. Hence it was very flexible to attend any such presentation at any time and also there was a provision for making any comment on the presentation. The access to online mode is extended for one-month post conference. Finally, the organizing committee was very professional and didn't cause any inconvenience to the delegates during the 17WCEE.

Your comments on the conference:

The 17th World Conference on Earthquake Engineering 2020-21 was a well-organised conference. The organising committee of 17WCEE had efficiently put together a very promising conference in spite of the ongoing pandemic. The conference brought together great minds and researchers from various parts of the world. The keynote lectures were interesting and enlightening and at the same time very informative too. The parallel sessions, comprising of high quality papers selected for oral presentation, SOP, and poster presentation were educative and interactive. The daily events of the conference, parallel technical sessions and exhibitions, were organised very well by the committee. I sincerely thank the organising committee for giving me an opportunity to present my work. I am very much grateful to "ISSMGE Foundation" for providing me with the support and grant to attend such a memorable and grand conference.

Please attach short report (maximum 400 words) suitable for publication in the ISSMGE Bulletin:

17th World Conference on Earthquake Engineering (17WCEE), 2020-21
September 27 to October 2, 2021

The World Conference on Earthquake Engineering is a well-renowned world conference in the field of geotechnical, earthquake and structural engineering. It is organized once in four years.

The 17th World Conference on Earthquake Engineering 2020-21, was held in hybrid mode, both an in-person conference and a virtual (on-line) conference due to COVID-19 pandemic. The online access is further extended for one-month post conference period. The Conference was originally planned to be held from September 13 to 18, 2020, but due to the COVID-19 problem, the 17WCEE Organizing Committee, decided to postpone the 17WCEE by one year, to be held from September 27 to October 2, 2021, the 10th

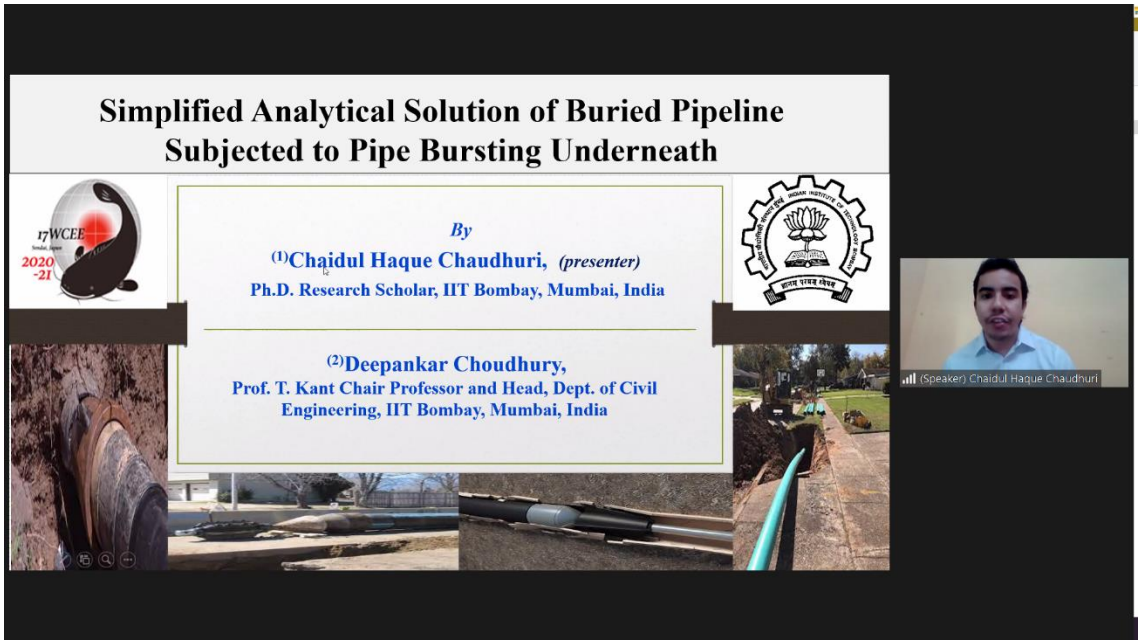
anniversary year of the 2011 Great East-Japan Earthquake and Tsunami Disaster in the same venue, in Sendai City, Miyagi Prefecture, Japan. The conference consisted of various programs which included the keynote lectures, invited lectures, oral and poster presentations, short presentations (SOP), technical parallel sessions, and exhibition.

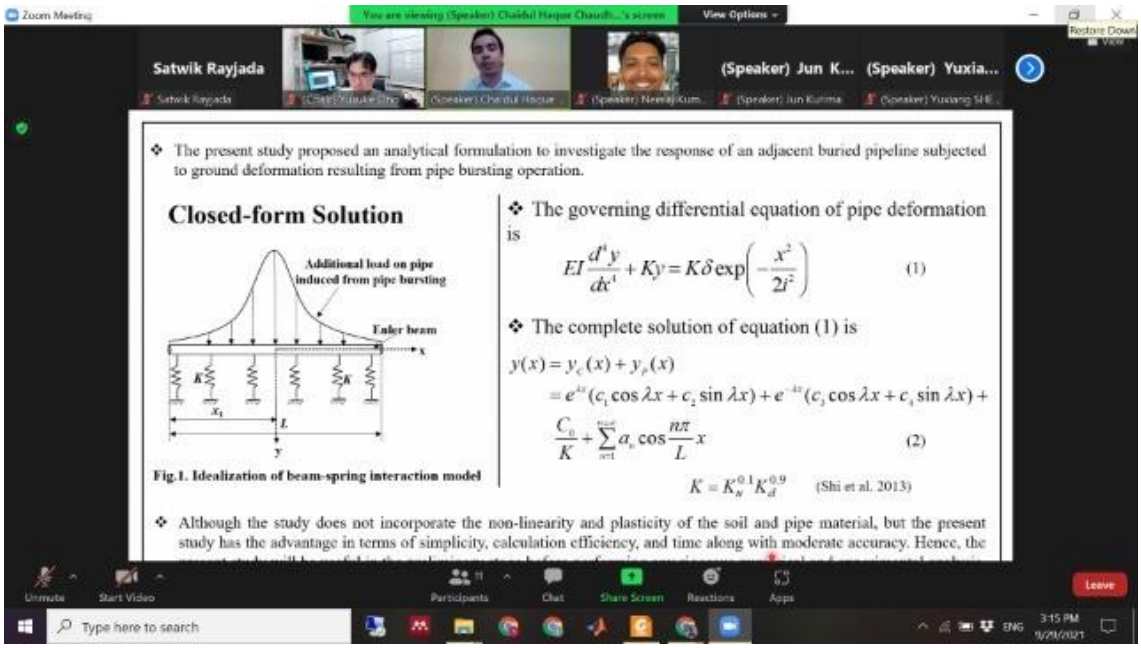
The conference covered several topics from engineering such as Engineering Seismology, Seismic Performance of Structures, Assessment and Retrofitting of Structures, Geotechnical Earthquake Engineering, Tsunami disaster, Preparedness and Emergency Management, Social and Economic Aspects, Seismic Loss and Risk Management, Innovative Technology, Lessons Learnt from Earthquakes, and others.

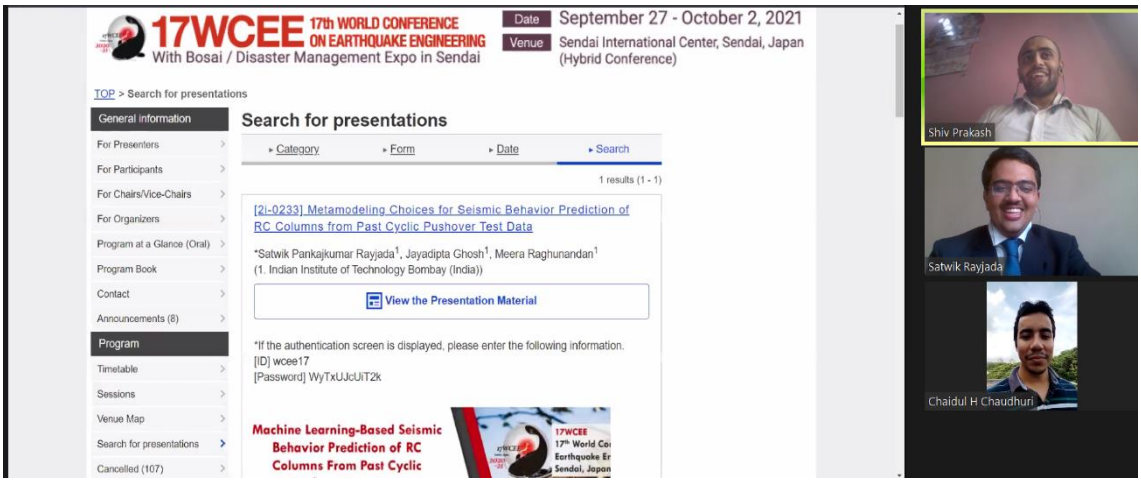
As the conference was in hybrid mode so maximum presentation is available in the website with the audio of the speakers. Hence it was very flexible to attend any such presentation at any time and also there was a provision for making any comments on the presentation in the comment box. The access to online mode is extended for one-month post conference. It was a great honour for me to present my research work at this prestigious world conference. The organizing committee was also very professional and didn't cause any inconvenience to the delegates during the 17WCEE.

In overall, the 17WCEE conference provided me a valuable opportunity to learn about the research being carried out in different universities and also to understand the different aspects of latest technologies of geotechnical, earthquake and structural engineering. This will help me in improving my area of research. I am beholden to ISSMGE Foundation for providing me with financial support for participating in this prestigious conference through virtual (on-line) mode.

Photographs from Conference: Insert here or attach to email






17WCEE 17th WORLD CONFERENCE ON EARTHQUAKE ENGINEERING
With Bosai / Disaster Management Expo in Sendai
Date September 27 - October 2, 2021
Venue Sendai International Center, Sendai, Japan (Hybrid Conference)
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[2i-0233] Metamodeling Choices for Seismic Behavior Prediction of RC Columns from Past Cyclic Pushover Test Data
*Satwik Pankajkumar Rayjada[1], Jayadipta Ghosh[1], Meera Raghunandan[1]
(1. Indian Institute of Technology Bombay (India))
View the Presentation Material
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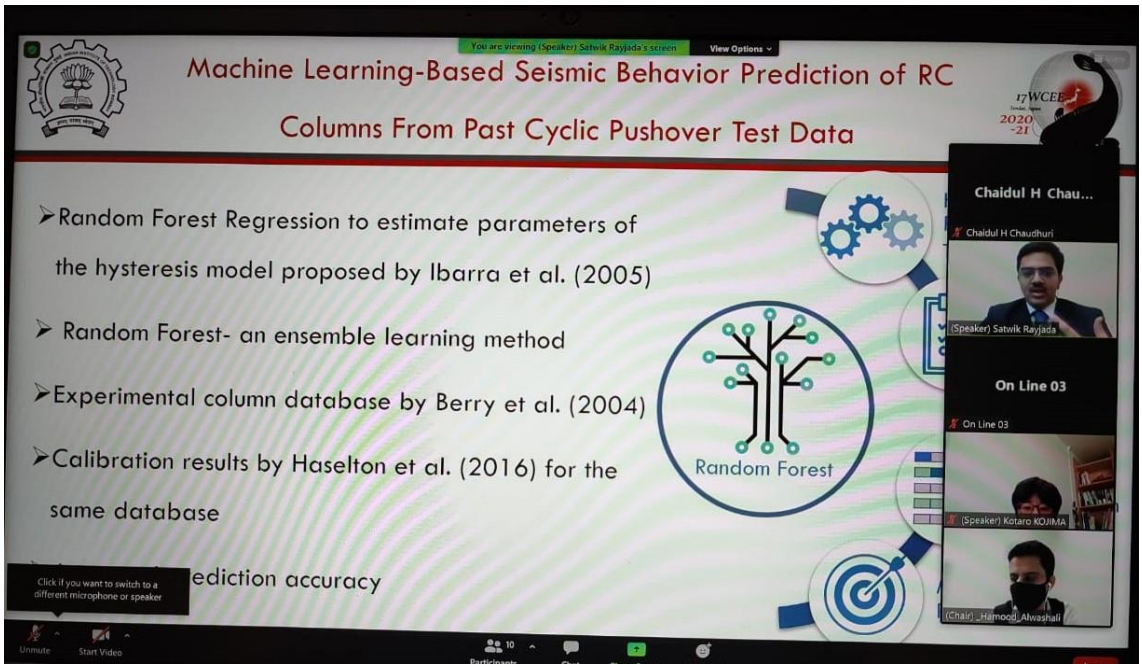
Machine Learning-Based Seismic Behavior Prediction of RC Columns From Past Cyclic
Shiv Prakash
Satwik Rayjada
Chaidul H Chaudhuri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Machine Learning-Based Seismic Behavior Prediction of RC Columns From Past Cyclic Pushover Test Data
17WCEE 2020 -21
➢Random Forest Regression to estimate parameters of the hysteresis model proposed by Ibarra et al. (2005)
➢ Random Forest- an ensemble learning method
➢Experimental column database by Berry et al. (2004)
➢Calibration results by Haselton et al. (2016) for the same database
ediction accuracy
Random Forest
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Chaidul H Chaudhuri
(Speaker) Satwik Rayjada
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(Speaker) Kotaro KOJIMA
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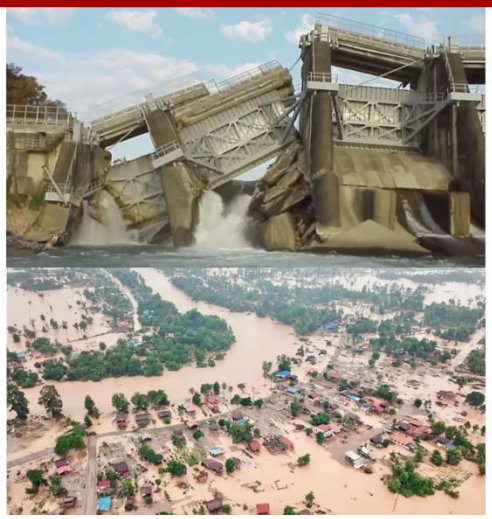
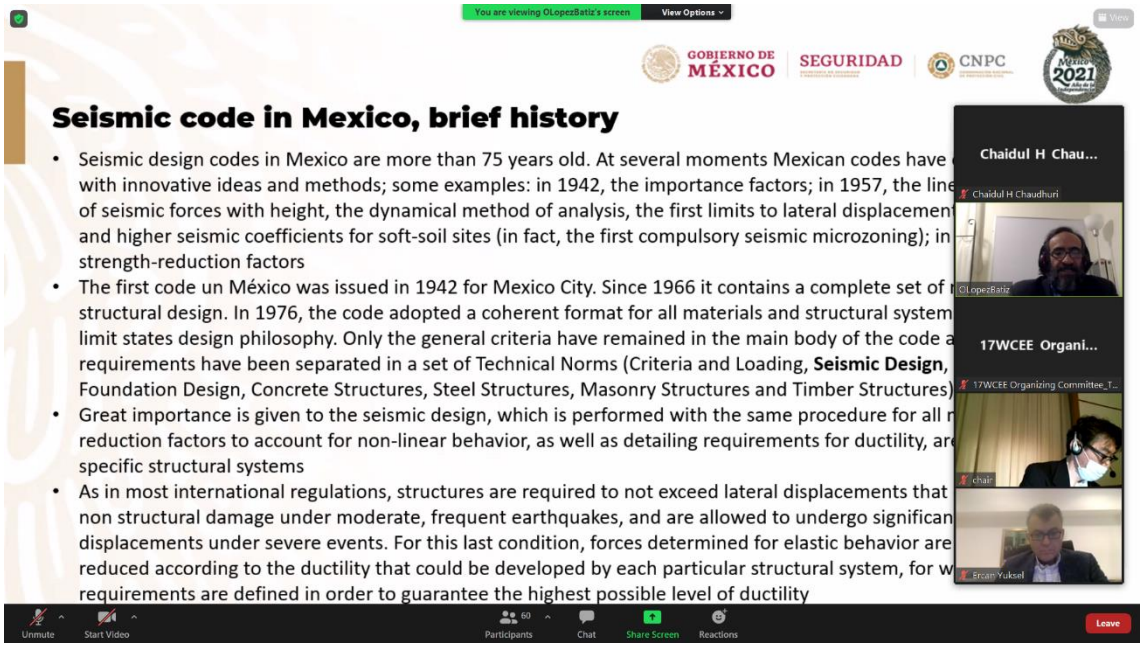
Introduction



Why is dam failure import

- Dam provides water supply and
  a community
- Dam failure have the potential o
  entire cities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GOBIERNO DE MÉXICO
SEGURIDAD
CNPC
Seismic code in Mexico, brief history
• Seismic design codes in Mexico are more than 75 years old. At several moments Mexican codes have
with innovative ideas and methods; some examples: in 1942, the importance factors; in 1957, the line
of seismic forces with height, the dynamical method of analysis, the first limits to lateral displacemen
and higher seismic coefficients for soft-soil sites (in fact, the first compulsory seismic microzoning); in
strength-reduction factors
• The first code un México was issued in 1942 for Mexico City. Since 1966 it contains a complete set of
structural design. In 1976, the code adopted a coherent format for all materials and structural system
limit states design philosophy. Only the general criteria have remained in the main body of the code a
requirements have been separated in a set of Technical Norms (Criteria and Loading, Seismic Design,
Foundation Design, Concrete Structures, Steel Structures, Masonry Structures and Timber Structures)
• Great importance is given to the seismic design, which is performed with the same procedure for all
reduction factors to account for non-linear behavior, as well as detailing requirements for ductility, ar
specific structural systems
• As in most international regulations, structures are required to not exceed lateral displacements that
non structural damage under moderate, frequent earthquakes, and are allowed to undergo significan
displacements under severe events. For this last condition, forces determined for elastic behavior are
reduced according to the ductility that could be developed by each particular structural system, for w
requirements are defined in order to guarantee the highest possible level of ductility
Chaidul H Chau...
Chaidul H Chaudhuri
OLopezBatiz
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17WCEE Organizing Committee_T...
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Ercan Yuksel
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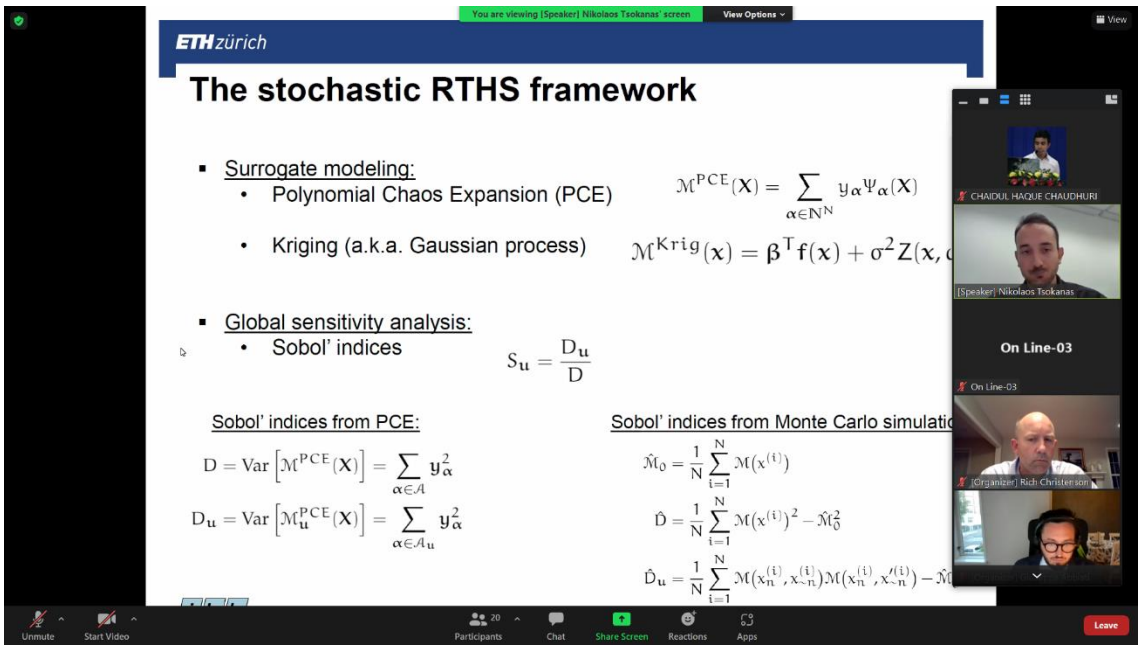
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ETH zürich
The stochastic RTHS framework
Surrogate modeling:
Polynomial Chaos Expansion (PCE)
$\mathcal{M}^{\mathrm{PCE}}(\mathbf{X}) = \sum_{\alpha \in \mathbb{N}^N} y_\alpha \Psi_\alpha(\mathbf{X})$
Kriging (a.k.a. Gaussian process)
$\mathcal{M}^{\mathrm{Krig}}(\mathbf{x}) = \boldsymbol{\beta}^{\mathrm{T}} \mathbf{f}(\mathbf{x}) + \sigma^2 Z(\mathbf{x},$
Global sensitivity analysis:
Sobol' indices
$S_{\mathbf{u}} = \frac{D_{\mathbf{u}}}{D}$
Sobol' indices from PCE:
$D = \mathrm{Var}\left[\mathcal{M}^{\mathrm{PCE}}(\mathbf{X})\right] = \sum_{\alpha \in \mathcal{A}} y_\alpha^2$
$D_{\mathbf{u}} = \mathrm{Var}\left[\mathcal{M}_{\mathbf{u}}^{\mathrm{PCE}}(\mathbf{X})\right] = \sum_{\alpha \in \mathcal{A}_{\mathbf{u}}} y_\alpha^2$
Sobol' indices from Monte Carlo simulatio
$\hat{\mathcal{M}}_0 = \frac{1}{N}\sum_{i=1}^{N} \mathcal{M}(\mathbf{x}^{(i)})$
$\hat{D} = \frac{1}{N}\sum_{i=1}^{N} \mathcal{M}(\mathbf{x}^{(i)})^2 - \hat{\mathcal{M}}_0^2$
$\hat{D}_{\mathbf{u}} = \frac{1}{N}\sum_{i=1}^{N} \mathcal{M}(\mathbf{x}_{\mathbf{u}}^{(i)}, \mathbf{x}_{\sim\mathbf{u}}^{(i)})\mathcal{M}(\mathbf{x}_{\mathbf{u}}^{(i)}, \mathbf{x}_{\sim\mathbf{u}}^{\prime(i)}) - \hat{\mathcal{M}}$
CHAIDUL HAQUE CHAUDHURI
[Speaker] Nikolaos Tsokanas
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On Line-03
[Organizer] Rich Christenson
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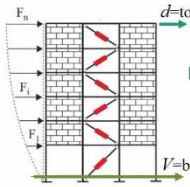
$F_i = m_i \phi_i$
ϕ=displacement shape

INFILLED FRAME WITH DAMPED BRACES (IFDB)

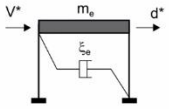


In-parallel systems:

Bare frame (F) +	Infill walls (W) +	Damped braces (DB

Equivalent stiffness of IFDB:

$$K_e = K_e^{(F)} + K_e^{(W)} + K_e^{(DB)}$$



Equivalent viscous damping of IFDB:

$$\xi_e = \xi_V + \frac{\xi_F^{(h)} V_p^{(F)} + \xi_W V_p^{(W)} + \xi_{DB} V_p^{(DB)}}{V_p^{(F)} + V_p^{(W)} + V_p^{(DB)}}$$

$d^* = d / \Gamma$
$V^* = V / \Gamma$
$\Gamma = \sum m_i \phi_i / \sum m_i \phi_i^2$
$m_e = \sum m_i \phi_i \ (\phi_n = 1)$
$T_e = 2\pi \sqrt{m_e / K_e}$

ξ_V=elastic viscous damping for the framed structure (e.g. ξ_V=5%);
$\xi_F^{(h)}$ and ξ_{DB}: already calculated in steps 1 and 2, respectively;
ξ_W and $V_p^{(W)}$: damping and of infill walls;
$V_p^{(F)}$, $V_p^{(W)}$ and $V_p^{(DB)}$: shear of bare framed structure, infill walls an
and hysteretic damped braces, respectively.