2024 NHERI Computational Symposium Agenda

University of California, Los Angeles
Meyer and Renee Luskin Conference Center
425 Westwood Plaza, Los Angeles, CA 90095

February 1 Overview Agenda

Time (PST)	Event	Location & Moderator
7:00 AM	Buffet breakfast	Centennial Ballroom
8:30	Welcome *Matthew DeJong*	Centennial Ballroom
8:40	NSF Welcome *Daniel Linzell*	Centennial Ballroom
8:50	Research and Development Highlights and Future Opportunities in Computational Simulation for Natural Hazards Engineering *Greg Deierlein & Scott Brandenberg*	Centennial Ballroom
9:30	**Session 1: State of the Art Computational Research Advancing Natural Hazards Engineering**	Centennial Ballroom Laura Lowes
10:30	Break	
11:00	**Session 2: Cross-cutting Topics of Computational Research in Natural Hazards**	Centennial Ballroom Ellen Rathje
12:10 PM	Buffet lunch	
1:00	**Session 3: Parallel Sessions**	
	3A: Societal Dimensions of Resilience and Recovery	Illumination Room Henry Burton
	3B: Regional Risk Assessment	Legacy Room Ertugrul Taciroglu
	3C: Structural Response Simulation	Exploration Room Joel Conte
	3D: Water and Wind Fluid Dynamics	Imagination Room Andrew Kennedy
2:20	Break	
2:45	**Session 4: AI/ML in Natural Hazards Research**	Centennial Ballroom Sanjay Govindjee
4:00	**Session 5: Computational Workflows: Reducing Risk & Enhancing Community Resilience**	Centennial Ballroom Matt DeJong
4:55	**Wrap-up Plenary**	Centennial Ballroom
5:00	**Closure**	
5:00-7:00	**Poster Session & Welcome Reception**	Centennial Ballroom

February 2 *8:30 am-12:00 pm*

Time (PST)	Event	Location & Moderator
7:00 AM	Buffet breakfast	Centennial AB
8:30	Welcome *Matthew DeJong*	Centennial AB
8:45	**Session 6: Tools and Resources**	
	6A: Innovative Use of DesignSafe Computational and Data Resources	Imagination Room Ellen Rathje & Scott Brandenberg
	6B: Advancing natural hazard science and engineering by applying computational methods and tools to analyze data collected using RAPID equipment	Illumination Room Jeff Berman
	6C: Simulation as an Educational Resource	Enlightenment Room Adam Zsarnóczay
	6D: Opportunities and Challenges for Regional UQ	Discovery Room Alex Taflanidis
	6E: Socio-economic Models and Data for Inclusion in R2D	Transformation Room Rachel Davidson
9:30	Break	
10:00	**Session 7: Thematic Discussions**	
	7A: Incorporating Multi-resolutions Models and Interdependencies in Regional Earthquake Simulations	Illumination Room Greg Deierlein
	7B: Simulation Needs and Opportunities in Regional Windstorm Loss Assessment	Enlightenment Room Tracy Kijewski-Correa
	7C: Emerging Hazards for NHERI SimCenter Co-development and Support Efforts	Imagination Room Ertugrul Taciroglu
	7D: Computational Simulation of Wind and Hydro load Effects using CFD	Transformation Room Ahsan Kareem & Mike Motley
12:00 PM	**Symposium Close**	

Post-Symposium Workshop *12:10 -3:30 pm*

12:10 - 1:20	Networking Lunch: Pizza at the UCLA Civil and Environmental Engineering Department	Engineering VI Building Lobby
1:30	**Interactive Sessions with the SimCenter**	UCLA Engineering VI

	Development Team, DesignSafe Experts, and NSF	Building
	Track 1. Open Format Consultation Sessions	Cohen Meeting Room 134
	Track 2. Hands-On Guidance: Navigating the R2D Tool	Room 289
	Track 3. Hands-On Guidance: Navigating WE-UQ, Hydro-UQ, and quoFEM	*BioEngr Building V*: EV4101
	Track 4. Hands-On Guidance: Navigating EE-UQ, PBE Application, and quoFEM	*BioEngr Building V*: EV5101
	Track 5. OpenSees on DesignSafe	Room 100-E6
	Track 6. AI/ML within DesignSafe JupyterHub	Mong Learning Center
	Track 7. Office Hours with NSF Program Director Joy Pauschke (email jpauschk@nsf.gov to request a time slot)	Room 372
2:30	Break	
2:40 - 3:30	**Interactive Sessions with the SimCenter Development Team, DesignSafe Experts, and NSF**	UCLA Engineering VI Building
	Track 1. Open Format Consultation Sessions	Cohen Meeting Room 134
	Track 2. Hands-On Guidance: Navigating the R2D Tool	Room 289
	Track 3. Hands-On Guidance: Navigating WE-UQ, Hydro-UQ, and quoFEM	*BioEngr Building V*: EV4101
	Track 4. Hands-On Guidance: Navigating EE-UQ, PBE Application, and quoFEM	*BioEngr Building V*: EV5101
	Track 5. OpenSees on DesignSafe	Room 100-E6
	Track 6. AI/ML within DesignSafe JupyterHub	Mong Learning Center
	Track 7. Office Hours with NSF Program Director Joy Pauschke (email jpauschk@nsf.gov to request a time slot)	Room 372
3:30 PM	**Workshop Close**	

Session 1 (9:30 – 10:30)

State of the Art Computational Research Advancing Natural Hazards Engineering	
Presenter	**Title**
Carlos Molina Hutt	Impacts of M9 Cascadia Subduction Zone Earthquakes on the Seismic Performance of Tall Non-Ductile Reinforced Concrete Shear Wall Buildings
Seymour Spence	A Deep Learning-based Multi-Fidelity Monte Carlo (DL-MFMC) scheme for efficient reliability analysis of nonlinear structural systems subject to natural hazards
Tracy Kijewski-Correa	Automating assembly-based visual damage detection to accelerate learning from disasters

Session 2 (11:00 – 12:10) Lightning Talks

Cross-cutting Topics of Computational Research in Natural Hazards	
Presenter	**Title**
Neetesh Sharma	Optimal scenario selection for probabilistic multi-hazard analyses
Pouria Kourehpaz	How important are parameter choices in seismic loss and recovery time estimation?
Jianhua Xian	Physics and data co-driven surrogate modeling for high-dimensional rare event simulation
Arthriya Subgranon	Uncertainty quantification of wind-tunnel-informed translation models for simulation of non-Gaussian stochastic wind pressures on buildings
Ahsan Kareem	Multi-scale simulation of typhoon wind field at building scale utilizing mesoscale model with nested large eddy simulation
Justin Bonus	Bringing Disney-esque Approaches to Tsunamis and Storm-Surge Design / Uncertainty Quantification via the NHERI SimCenter's HydroUQ
Rachel Hamburger	A unifying framework and a shared model library for hurricane wind damage and loss simulation
Francisco A. Galvis & Barbara Gao	Using Functional Recovery Simulations to Inform Stakeholder Decisions

Session 3A (1:00 – 2:20) Lightning Talks

Societal dimensions of resilience and recovery	
Presenter	**Title**
Kristen Blowes	Using red tag probability to inform functional recovery design provisions
Kooshan Amini	Enhancing Coastal Resilience to Hurricane-Induced Debris: Application of Deep Learning Algorithms
Pallab Mozumder	Critical-Infrastructures Resilience Across US States During Extreme Events: Hurricane Harvey Versus Irma
Zeinab Farahmandfar	Alternatives for Resilient Communities with Consideration of Uncertainty
Jangjae Lee	Ensemble-based Time Series Modeling for Predicting Power Outages During Extreme Weather: A Multi-factor Approach Integrating Meteorological, Geographical, and Socio-Demographical Features
Xu Han	Community resilience analysis under seismic hazard using agent-based modeling approach
Amin Enderami	A Framework for Predicting a Community's Post-Disaster Temporary Housing Demand
Diako Abbasi	Assessing Adaptive Resilience in School Districts During Hurricane-Induced Closures

Session 3B (1:00 – 2:20) Lightning Talks

Regional risk assessment	
Presenter	**Title**
Amal Elawady	Balancing Protection and Risk: Understanding the Dual Impact of Trees on Low-Rise Buildings During Extreme Wind Events
Eunsaem Cho	Probabilistic Hydrodynamic Modeling of Compounding rain-storm surge Flood Events for Vulnerability Assessments of Critical Infrastructures in Coastal Cities
Mehrshad Amini	Model-data validation of the IN-CORE damage model for buildings impacted by Hurricane Ian (2022) at Fort Myers Beach, Florida
Laxman Dahal	Efficient Computational Strategies to Facilitate High-Fidelity Regional Seismic Risk and Resilience Assessment
Derek Manheim	State-of-the-Art Modeling of Post-Disaster Waste Material Quantity and Composition from the Kahramanmaras Earthquake
Juan Miguel Valois Martinez	Earthquake hindcasting and assessment of structural damage in an inventory of tall welded steel moment frame buildings
Parisa Toofani Movaghar	Exploring the sensitivity of regional risk assessment in the context of reduced order model fidelity
Sebin Oh	Fragility field for the performance-based earthquake engineering on a regional scale
Gaby Ou	Improving regional building damage estimation with sparse samples using a Gaussian Process based multi-fidelity learning method

Session 3C (1:00 – 2:20) Lightning Talks

Structural response simulation	
Presenter	**Title**
Maitreya Manoj Kurumbhati	Hierarchical Bayesian Modeling and Updating Applied to Linear FE Model of the Geisel Library
Chenhao Wu	Model misspecification in seismic code-prescriptive and risk-based assessments of CA bridges
Kayla Erler	DesignSafe Machine Learning Example Case for Regression Analysis
Miguel Gomez	A surrogate model for the prediction of the hysteresis behavior of reinforced concrete columns
Aakash Bangalore Satish	Gaussian Process Surrogate-Aided Efficient Bayesian Posterior Sampling
Yongjia Xu	Data-Physics Coupling Driven Multi-Scale Response Simulation Method for Shear Wall Structures

Session 3D (1:00 – 2:20) Lightning Talks

Water and wind fluid dynamics	
Presenter	**Title**
Thays Duarte	Uncertainty quantification and guidance on the use of stochastic wind load models calibrated using wind tunnel experimental data
Sang-ri Yi	Database-enabled surrogate modeling to predict surface wind pressure statistics of two adjacent buildings
Seymour Spence	Hurricane damage estimation for clusters of buildings based on CFD simulations
Negar Elhami-Khorasani	Towards addressing the wildfire problem: Large-scale simulation of fire spread in communities
Nicolette Lewis	Partitioned Coupling OpenFOAM to OpenSees for Multi-hazard Fluid-Structure-Interaction Simulation of Civil Engineering Structures
Dimitrios Kalliontzis	Fluid-Structure Interaction with ALE-SSM: A new approach to simulate structural responses to fluid-induced loading for natural hazards
Fahad Pervaiz	Assessing Coastal Bridge Vulnerability to Wave Loading During Hurricanes
Akiri Seki	An application of hydrodynamic real time hybrid simulation to examine the response of single-degree-of-freedom oscillator subjected to solitary waves

Session 4 (2:45 – 4:00) Lightning Talks

AI/ML in Natural Hazards Research	
Presenter	**Title**
Wenyang Zhang	Probabilistic machine learning approaches for efficient regional-scale seismic fragility and loss assessments of buildings
Henry Burton	Complete Reconstruction of Backbone Curves for use in Structural Macro-Element Models
Insung Kim	AI for ASCE 41 Life Safety Seismic Performance Evaluation
Mia Lochhead	Surrogate Models of Highway Bridges for Regional-Scale Simulations of Transportation Networks
Erica Fischer	Use of machine learning to identify mechanistic behavior of housing during the 2021 Marshall Fire
Nasimeh Rashidi	Machine-learning-enabled Dynamic Vegetation Mapping for Enhanced Wildfire Risk Assessment
Fei Pan	Zero-shot Building Attribute Extraction from Large-Scale Vision and Language Models
Patrick Lynett	Machine-Learning Surrogates for Second-Order Corrections in Wave Models
Jian-Xun Wang	Scientific Machine Learning Enhanced Computational Fluid Dynamics
Teng Wu	Optimizing Post-Hurricane Recovery of Interdependent Infrastructure Systems via Knowledge-Enhanced Deep Reinforcement Learning

Session 5 (4:00 – 4:45)

Computational Workflows Reducing Risk & Enhancing Community Resilience	
Presenter	**Title**
Kenny Buyco	Risk Assessment Class Taxonomy: Workflows for different levels of multi-hazard risk assessment
Elaina Sutley	A Computational Workflow for Predicting Long-term Housing Recovery
Rachel Davidson	Three example computational workflows as vehicles to enhance collaboration and advance research

Poster Session (Feb 1, 5:00 – 7:00)

Presenter	Title
Wind Hazards	
Mohammad AL-Shatnawi	Numerically Investigating the Effects of RTWC Types on the Wind Resistance Performance of Light-Frame Roof Structure
Christina Bocirnea	Deep Learning-Based Estimation of Peak Wind Pressures on Buildings from Short Duration Measurements
Qiang Chen	Laboratory Study of Tornado-Like Loading on a Low-Rise Building Model
Xinlong Du	Detached-eddy simulation of wind loads on a ground-mounted solar array
Tasnuba Binte Jamal	Strengthening Community Resilience by Modeling Transportation and Electric Power Network Interdependencies
Wei Song	Deep learning classifier for tornado damage assessment
Haifeng Wang	Hurricane Trajectory Synthesis using Conditional Neural Network
Tsunami and Storm Surge Hazards	
Gizem Ezgi Cinar	Regional Tsunami Simulation Using R2D Tool
Behzad Ebrahimi	Next-Generation Tsunami Preparedness: A Real-Time, GPU-Accelerated Evacuation Simulator in a Game Environment
Willington Renteria	VAE as a transfer function to predict onshore hazard curve from offshore information
Hiramani Raj Chimauriya	Empirical Model to Predict Scour Around Shallow Foundations Using Fully-Coupled 3D Numerical Simulation Studies
Xuan Ma	Hurricane induced riverine-coastal flooding on communities of Atchafalaya basin
Saeed Saleh Namadi	Assessing Community Resilience and Mobility Shifts in Response to Major Disasters: A Case Study on Hurricane Ida
Multi-Hazard and Additional Hazards	
Abdullah Braik	A Novel Digital Twin Framework for Efficient Electric Power Restoration and Resilient Recovery in the Aftermath of Hurricanes Considering Interdependencies with Road Networks and Essential Facilities
Judith Brennan	Infrastructure Failure Impacts on Socially Vulnerable Communities in Puerto Rico after Hurricane Fiona
Anthony Flores	Exploring Landslide Dynamics using Anura3D: A Study on Numerical Analysis, Rigid Surface Modeling, and Material Point Method
Steven Klepac	BRAILS-enabled machine learning approach to predict building damage from coastal hazards
Amina Meselhe	Human-centered connectivity and transportation network recovery following a Cascadia Subduction Zone Earthquake and Tsunami
Ali Nejat	Utilizing Deep Learning to Advocate for Equitable Community Resilience
Mia Leigh Renna	Effectively Prioritizing Hazard Mitigation Projects for the State of Illinois Through Quantifying Benefits
Xiaoyun Shao	Developing mem-models for natural hazard engineering research
Chao Sun	Large eddy simulation of wind turbulences over non-breaking and breaking waves
Earthquake Hazards	
Gustavo A. Araújo R.	Accelerating Finite-Element Structural Elastic Dynamic Analysis Using GPU Computing
Xiaolei Chu	Complexity profile as a global metric for multiscale collective behaviors of civil systems
Gloria Faraone	Assessing Hazards Risk in San Diego with R2D
Omar Issa	Machine learning-based optimization framework to support recovery-based design

Debasish Jana	Integrating Equity into Probabilistic Seismic Risk Assessment and Retrofitting Strategies for the Los Angeles Hillside Transportation Network
Konstantinos N. Kalfas	Seismic Response of Rocking Structures Equipped with Pressurized Sand Dampers Through Real-Time Hybrid Simulations
Zarak Kasi	An Application of Physics Informed Recurrent Neural Networks to Structural Dynamics
Maria Camila Lopez Ruiz	Implications of Bearing Rotations in Bridge Performance Using a Hybrid Simulation Experiment
Geraldine Lynch	Influence of Different Building Damage Prediction Models on Regional-scale Seismic Risk Estimates
Amin Pakzad	High-Fidelity Dynamic Analysis of Pile Foundations: A Step-by-Step Procedure with Emphasis on Realistic Modeling and High-Performance Computing
Mohammad Hesam Soleimani-Babakamali	Deep Ensemble Learning for Rapid Large-Scale Post-Earthquake Damage Assessment—Application to 2023 Türkiye Earthquakes Satellite Images
Chu-Han (Clifford) Yen	A Rupture to Rafters Workflow incorporating Soil-Structure Interaction: A Case Study in Istanbul
Mohsen Zaker Esteghamati	A design-oriented machine learning tool for seismic loss assessment
UQ in Earthquake Hazards	
Bryam Astudillo	Modeling uncertainty of full-scale specimens that employ spines and force-limiting connections
Mustafa Cetinkaya	Global Sensitivity Analysis of a Bridge Column Featuring SMA and ECC: considering variations in material properties
Abdoul Aziz Sandotin Coulibaly	Surrogate Modeling of Nonlinear Structural Systems with Long Short-Term Memory (LSTM) Networks for Probabilistic Performance-Based Seismic Assessment
Jawad Fayaz	Bayesian Neural Networks based Structural Demand Estimation Surrogate Models
Dimitris Giovanis	Seismic risk assessment of structures using manifold learning-based surrogate modeling
Luis Ibarra	Identification of Main Predictors of Collapse Capacity on Steel Buildings using Several Sensitivity Analysis Techniques
Jungho Kim	High-dimensional forward uncertainty quantification using surrogate model extracted from dimensionality reduction
Min Li	Surrogate-based Seismic Risk Assessment of Large-scale Transportation Networks Considering Component Damage Correlation
C. Franco Mayorga	Effect of Uncertainty in RC Walls on Seismic Responses of Buildings with Force-limiting Connections
Maziar Mivehchi	Towards the Quantitative Validation and Uncertainty Quantification of Liquefiable Geosystems
Ioannis Vouvakis Manousakis	Enhancing EDP Generation: Direct utilization of residual drift analysis results
Ya-Heng Yang	Incorporating Expert Knowledge for Bayesian Model Averaging in Structural Engineering: A Sammon's Mapping Approach

Session 6A (8:45 – 9:30am)

Innovative Use of DesignSafe Computational and Data Resources	
Presenter	**Title**
Seyed Sasan Khedmatgozar Dolati	Quantifying the Effects of Seismic Loading History on the Collapse Behavior of Concrete Columns
Kooshan Amini	Leveraging cyberinfrastructure to support modeling of hurricane-induced debris impacts for coastal community resilience analysis
Justin Bonus	Bringing Disney-esque Approaches to Tsunami, Storm-Surge, and Debris-Field Simulation / Uncertainty Quantification via the NHERI SimCenter's HydroUQ
Kayla Erler	DesignSafe Machine Learning Example Case for Regression Analysis

Session 6B (8:45 – 9:30am)

Advancing Natural Hazard Scientific and Engineering by Applying Computational Methods and Tools to Analyze Data Collected Using RAPID Equipment	
Presenter	**Title**
Barbaros Cetiner	NHERI SimCenter Workflows for Automated Extraction of Inventory and Damage Data from NHERI RAPID Reconnaissance Data
Erica Fischer	Estimation of the behavior of a corroded steel industrial building using lidar generated section properties
Laura Lowes	Characterizing Damage to a Full-Scale Reinforced Concrete Building Tested using lidar
Sebastiao Appleton Figueira	Virtual Damage Assessment of Buildings Impacted by Hurricane Ian (2022) in Fort Myers Beach, FL

Session 6C (8:45 – 9:30am)

Simulation as an Educational Resource	
Panelist	**Institution**
Kenny Buyco	ARUP
Barbara Gao	Thornton Tomasetti
Maria Koliou	Texas A&M University
Barbara Simpson	Stanford University

Session 6D (8:45 – 9:30am)

Opportunities and Challenges for Regional UQ	
Presenter	**Title**
Jack Baker	Stochastic sampling strategies for infrastructure risk assessment
Carmine Golasso	Dynamic cities, dynamic natural-hazard risk: representing urban changes and hazard interactions in regional risk modeling for decision making under deep uncertainty
Alexandros Taflandis	Promoting computational efficiency for regional risk assessment applications

Session 6E (8:45 – 9:30am)

Socio-economic Models and Data for Inclusion in R2D	
Panelist	**Institution**
Luis Ceferino	University of California, Berkeley
Elaina Sutley	University of Kansas

Session 7A (10:00 – 12:00)

Incorporating Multi-resolutions Models and Interdependencies in Regional Earthquake Simulations	
Panelist	**Institution**
Jack Baker	Stanford University
Greg Deierlein	Stanford University
Sang-ri Yi	University of California, Berkeley
Jinyan Zhao	University of California, Berkeley
Adam Zsarnóczay	Stanford University

Session 7B (10:00 – 12:00)

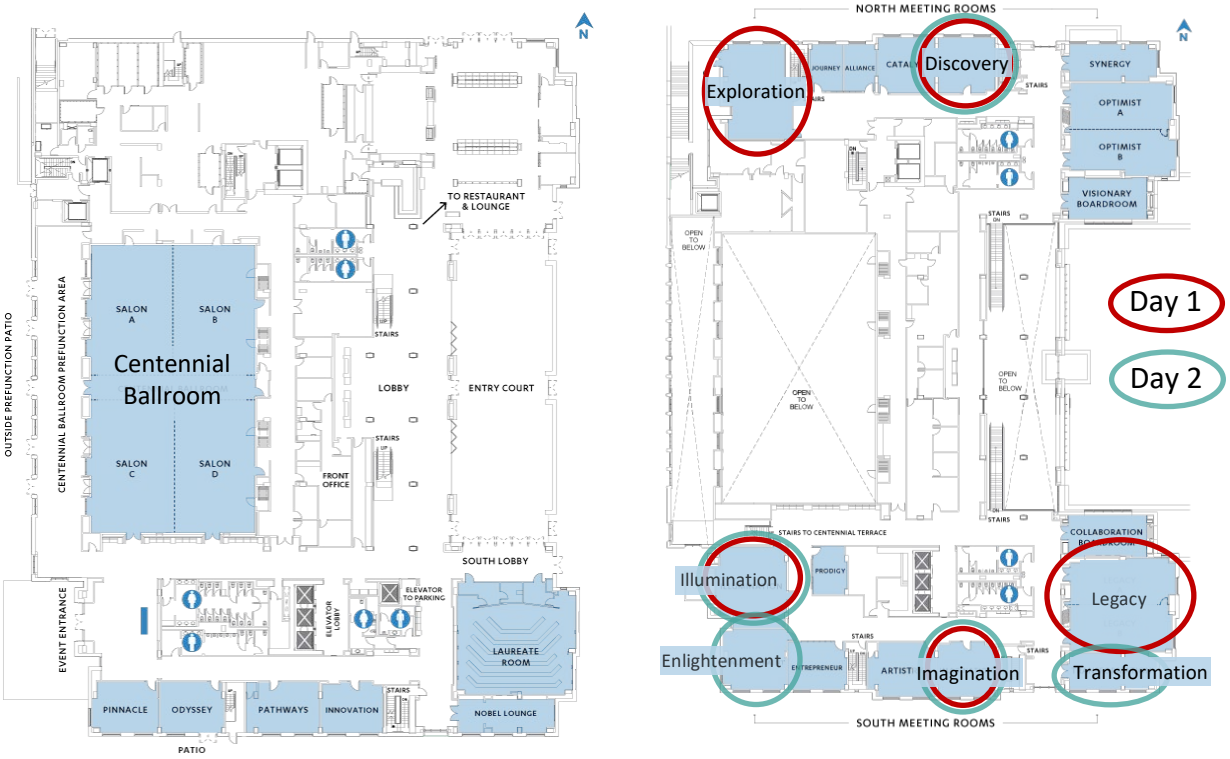
Simulation Needs and Opportunities in Regional Windstorm Loss Assessment	
Panelist	**Institution**
Teng Wu	University at Buffalo
Jean-Paul Pinelli	Florida Institute of Technology
Luis Ceferino	University of California, Berkeley

Session 7C (10:00 – 12:00)

Emerging Hazards for NHERI SimCenter: Co-development and Support Efforts	
Presenter	**Title**
Negar Elhami-Khorasani	Integration of data and models for large-scale simulation of fire spread across wildland and communities
Erica C. Fischer	Regional Assessment for Wildfire Hazards
Riyaaz Shaik	FUELVISION: A Multimodal Data Fusion and Multimodel Ensemble Algorithm for Wildfire Fuels Mapping
Richard Campos	Firestorm Simulation and Analysis in a Changing Climate: An Oklahoma Case Study in Community Resilience
Chao Fan	Simulating Urban Heat Environment through Physics-based Deep Learning
Zeinab Farahmandfar	Alternatives for Resilient Communities with Consideration of Uncertainty
Debasish Jana	Data-driven capital improvement strategy for the Los Angeles Hillside Transportation Network

Session 7D (10:00 – 12:00)

Computational Simulation of Wind and Hydro load Effects using CFD	
Presenter	**Title**
Di Yang	Effects of helical-shaped blades on turbulent flows in large arrays of vertical-axis wind turbines
Catherine Gorle	Towards high-fidelity large-eddy simulation of extreme wind/wave events in coastal regions
Nicolette Lewis & Mike Motley	Wave loads on Structures
Seymour Spence	Stochastic and CFD Modeling for PBD for wind
R. Panneer Selvam	NHERI Facility: National Testing Facility for Enhancing Wind Resiliency of Infrastructure in Tornado-Downburst-Gust Front Events (NEWRITE)
Abiy Melaku	A CFD-based workflow for high-fidelity simulation of wind effects on buildings with uncertainty quantification



Symposium meeting rooms

Map to Friday lunch and post-symposium workshop rooms