

## Objectives

Soft computing, machine learning and digital twins approaches to science and engineering have increasingly common. This growing interest is attributed to the advancement of techniques that enable the generation, acquisition and transmission of massive data across disciplines. Machine learning may refer to any technique that gives computers the ability to generate interpretations from data without relying explicitly on rule-based programming. The interest has grown rapidly due to the exponential growth of data, improved facilities such as GPU learning, Tensor Processing Unit, Evolutionary Techniques such as genetic programming, Ensemble Learning such as random decision forests, and more importantly the advancement of deep learning algorithms such as convolutional neural network, and backward propagation algorithms, among many others. To promote development and application of machine learning and digital twin (MLDT) technologies to the computational science and Engineering (CSE) communities, a new series of IACM Special Interest Conference entitled "Machine Learning and Digital Twins for Computational Science and Engineering (MLDT-CSE)" has been planned with the first one be hosted at San Diego during September 26-29, 2021.

Our main objective of MLDT-CSE is to bring together the diverse communities that are interested in learning, developing and applying machine learning and digital twins via computational science and engineering tools to a broad range of engineering and scientific problems, and to promote collaborations between engineers, data and computer scientists, and mathematicians from federal agencies, academia and industry in this field. A concerted effort will be to facilitate participation from engineering firms and computer and software companies to showcase industrial practice and identify challenges and needed MLDT technologies in industry. To promote awareness of machine learning and digital twins to general public, we will also organize special public lectures, short courses and demonstrations open to STEM high school teachers and students from underprivileged schools in Southern California and other States. A Fellowship Committee consisted of at least five respected scholars with diverse background will be formed to evaluate fellowship applications, and special emphasis will be on diversity and knowledge dissemination.

## Conference Co-Chairs

Wing Kam Liu

Northwestern University

J. S. Chen

UC San Diego

Charbel Farhat

Stanford University

Francisco Chinesta

Arts et Métiers Institute of Technology

George Karniadakis

Brown University

Wai Ching Sun

Columbia University

# 1ST IACM CONFERENCE ON MACHINE LEARNING AND DIGITAL TWINS FOR COMPUTATIONAL SCIENCE & ENGINEERING

<https://sites.google.com/eng.ucsd.edu/iacm-mldt-cse>

## Date and Location

Sept 26-29, 2021

Hyatt Regency Mission Bay, San Diego, California, USA

## Conference Topics

Track 1: Multiscale Materials and Engineered Systems

Track 2: Big Data and Machine Learning

Track 3: Digital Twins

Track 4: Advanced Manufacturing and Design

Track 5: Bio-systems, Medical Device and ML-enhanced diagnostics

Track 6: Reduced-order Modeling for Fluids, Solids, and Structures

Track 7: Computer Graphics, Gaming, and ML-specific Hardware

Track 8: Tensor Processing Unit and TensorCore

Track 9: Geosystem, Geostatistics, and Petroleum Engineering

Track 10: Data Centric Earthquake Engineering and Performance-based Design

Track 11: Education, Outreach, Short Courses

Track 12: Funding Opportunity Panel

Track 13: Public Lectures



ENGINEERING  
MECHANICS  
INSTITUTE

## Multi-Institution Organizing Committees

### UC San Diego and Local Organizing Committee

J. S. Chen (Chair)	Structural Engineering, Mech. & Aero. Engineering, CEER
Ken Loh (Co-Chair)	Structural Engineering, CEER, ARMOR Lab
Ilkay Altintas	San Diego Supercomputer Center
Joel Conte	Structural Engineering, NHERI @ UC San Diego
Yuri Fialko	Scripps Institute of Oceanography
Michael Hulst	Mathematics
Amarnath Gupta	San Diego Supercomputer Center
Rajesh Gupta	Data Science Institute
Boris Kramer	Mechanical & Aerospace Engineering
Andrew B. Kahng	Computer Science and Engineering
Alicia Kim	Structural Engineering, CEER
Shabnam Semnani	Structural Engineering, CEER

### Northwestern University

Jian Cao	Northwestern Institute of Manufacturing Science and Innovation
Wei Chen	Integrated DEsign Automation Laboratory, IDEAL
Wing Kam Liu	Mechanical & Civil Engineering
Matthew Plumlee	Industrial Engineering & Management Sciences
Gregory Wagner	

### Stanford University

Greg Beroza	Geophysics
Charbel Farhat	Aeronautics and Astronautics, AHPCRC
Ellen Kuhl	Mechanical Engineering

### Columbia University

George Deodatis	Civil Engineering and Engineering Mechanics
Qiang Du	Applied Physics and Applied Mathematics
Macro Giometto	Civil Engineering and Engineering Mechanics
Ioannis Kougioumtzoglou	Civil Engineering and Engineering Mechanics
WaiChing Sun	Civil Engineering and Engineering Mechanics

### Brown University

George Karniadakis	Applied Mathematics
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### Arts et Métiers Institute of Technology

Amine Ammar	LAMPA Lab
Ameziane Aoussat	LCPI Lab
Abdel Boudraa	French Naval Academy Research Institute
Francisco Chinesta	Arts et Métiers Institute of Technology
Paola Cinnella	DynFluid Lab
Stephane Clenet	L2EP Lab
Jean-Louis Duval	Arts et Metiers – ESI Chair on Digital Twins
Ivan Iordanoff	Arts et Metiers General Director for Research & I2M Lab
Fodil Meraghni	LEM3 Lab
Lionel Roucoules	LISPEN Lab
Philippe Veron	Carnot Arts Institute

## International Scientific Committee

Markus Buehler	Massachusetts Institute of Technology, USA
Jian Cao	Northwestern University, USA
David Chen	National Taiwan University, Taiwan
Sanjay Choudhry	Nvidia, USA
Elias Cueto	Universidad de Zaragoza, Spain
Qiang Du	Columbia University, USA
Weinan E	Princeton University, USA
Fangxin Fang	Imperial College London, UK
Krishnakumar Garikipati	University of Michigan, USA
Roger Ghanem	University of Southern California, USA
Dirk Hartmann	Siemens, USA
Antonio Huerta	Polytechnic University of Catalonia, Spain
Michael Kaliske	Technische Universität Dresden, Germany
Kazuo Kashiwama	Chuo University, Japan
Jaroslav Knap	Army Research Laboratory, USA
Nathan Kutz	University of Washington, USA
Frank Liu	Oak Ridge National Laboratory, USA
Bernd Markert	Rwth Aachen University, Germany
John Michopoulos	Naval Research Laboratory, USA
Michael Parks	Sandia National Laboratories, USA
Paris Perdikaris	University of Pennsylvania, USA
Stefanie Reese	RWTH Aachen University, Germany
Gianluigi Rozza	Scuola Internazionale Superiore di Studi Avanzati, Italy
Ruben Sevilla	Swansea University, UK
James Stewart	Sandia National Laboratories, USA
Shaoqiang Tang	Peking University, China
Kenjiro Terada	Tohoku University, Japan
Nien-Ti Tsou	National Chiao Tung University, Taiwan
Conrad Tucker	Carnegie Mellon University, USA
Gregory Wagner	Northwestern University, USA
Karen Wilcox	University of Texas - Austin, USA
Paul Witherell	National Institute of Standards and Technology, USA
C. T. Wu	LSTC, USA
Genki Yagawa	University of Tokyo, Japan
Masayuki Yano	University of Toronto, Canada
Shinobu Yoshimura	University of Tokyo, Japan
Julien Yvonnet	Universite Paris-Est, France
Jessica Zhang	Carnegie Mellon University, USA

### Location

The conference will take place at Hyatt Regency Mission Bay, San Diego, CA, USA. San Diego is a city on the Pacific coast of California known for its beaches, parks and warm climate. Immense Balboa Park is the site of the renowned San Diego Zoo, as well as numerous art galleries, artist studios, museums and gardens. A deep harbor is home to a large active naval fleet, with the USS Midway, an aircraft-carrier-turned-museum, open to the public.