WINTER SCHOOL

5th International course on

Seismic Analysis of Structures using OpenSEES

Finite Element-based Framework and Civil Engineering Applications

AIM OF THE COURSE

OpenSEES (Open System for Earthquake Engineering Simulations) is an open source software conceived for the seismic analysis of structures. The source code is public to facilitate its wide diffusion and to be adaptable to the needs of users, who can also modify and extend default libraries in terms of materials, components, and algorithms. The main difficulties that users usually face during their first approach to OpenSEES are due to the programming language, which might appear rather complex. Following previous editions, the main goal of this short course is to provide a basic understanding of finite element-based theoretical framework and programming language in OpenSEES. Applications in research and practice will be also presented.

SHORT PROGRAM

(Full program at http://international.polito.it/catalogue/summer_schools)

January **20,** 2020

8:30 -13:00 • Registration, • Framework, aims and scope of the course, • Seminar "Multi-fidelity modelling for collapse simulation of steel and composite structures with OpenSees", • Fundamentals of FEM.

14:00-19:00 • Seminar "Large scale simulations of virtual cities using OpenSees", • Introduction to TCL and OpenSees, • Static analysis of elastic frame structures.

January **21,** 2020

9:00 -13:00 • Methods and formulations for nonlinear analysis of reinforced concrete frames, • Static non-linear analysis of a simple structure using OpenSEES: concentrated plasticity approach.

14:00-19:00 • Special elements and commands in OpenSEES, • Advanced modelling of masonry infills, • Static non-linear analysis of a simple structure using OpenSEES: fiber approach, • Modelling and analysis of an inelastic frame structure subject to static incremental loads.

January **22,** 2020

8:30 -13:00 • Dynamic analysis of a simple structure using OpenSEES, • An example of dynamic analysis varying input action and geometry, • Connecting Matlab to OpenSEES and modelling of 3D structures, • Identification of the constitutive laws of materials.

14:00-19:00 • Modelling of shear-flexure interaction, • Adding a new material to Open SEES, • Nonlinear modelling and analysis of frame structures subject to seismic loads, • Closure and certificate ceremony.

MAIN ORGANIZERS

Giorgio Monti (Sapienza University of Rome, EOS), **Giuseppe Carlo Marano** (Politecnico di Torino), **Giuseppe Andrea Ferro** (Politecnico di Torino), **Fabio Di Trapani** (Politecnico di Torino), **Cristoforo Demartino** (Zhejiang University).

REGISTRATION AND FEES

Registration is required **before Januray 10, 2020** by sending an e-mail to: **opensees.eos.course@gmail.com.** The individual fee cost is **100 €.**

VENUE

Politecnico di Torino
Aula 5D, Corso Duca degli Abruzzi, 24, 10129 Torino.

SPEAKERS

Seminars

Dimitros Lignos
École Polytechnique Fédérale de Lausanne

Gian Paolo CImellaro
Poitecnico di Torino

Theoretical and applicative lectures

Cristoforo Demartino
Zhejiang University

Fabio Di Trapani
Politecnico di Torino

Emma La Malfa Ribolla
Czech Technical University

Davide Lavorato
Roma Tre University

Francesco Marmo
University of Naples Federico II

Giovanni Minafò
University of Palermo

Paolo Ricci
University of Naples Federico II

Salvatore Sessa
University of Naples Federico II

Applicative examples

Mariano Di Domenico
University of Naples Federico II

Giorgia Di Gangi
Sapienza University of Rome

Marzia Malavisi
Politecnico di Torino

SCIENTIFIC COMMITTEE

Giorgio Monti (Sapienza University of Rome, EOS), **Giuseppe Carlo Marano** (Politecnico di Torino), **Camillo Nuti** (Roma Tre University), **Luciano Rosati** (University of Naples Federico II), **Bruno Briseghella** (Fuzhou University)**, Fabrizio Mollaioli** (Sapienza University of Rome), **Sashi Kunnath** (UC Davis), **Yan Xiao** (Zhejiang University/University of Illinois at Urbana Champaign Institute), **Giuseppe Quaranta** (Sapienza University of Rome), **Rita Greco** (Politecnico di Bari), **Fabio Di Trapani** (Politecnico di Torino), **Cristoforo Demartino** (Zhejiang University), **Francesco Marmo** (University of Naples Federico II), **Giovanni Minafò** (University of Palermo).