Teachers

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Title

Nonlinear modeling of RC structures using OpenSees

Abstract

The course provides basic elements of nonlinear modeling of RC structures using the OpenSees (Open Software for earthquake engineering simulation) platform. The focus is on nonlinear modeling for seismic response analysis. OpenSees is an open source software, widely recognized in earthquake engineering research community, which allows code development and contributions by the single users, making it very suitable for advanced modeling and academic research activities. The course is structured in theory and practice lessons. The theory lessons recall basic principles of structural modeling and provide elements of nonlinear modeling, with emphasis on RC frame structures subjected to seismic action. The practice lessons allow the construction of a numerical model reproducing a simple 3D structure and the execution of the main analyses for earthquake engineering purposes, from eigen to nonlinear static and dynamic. The first part of the course is focused on the introduction to the software, with basic concepts regarding the object-oriented approach including the definition of geometry, elements, and materials of the numerical model, response recorders and analysis commands. Then, basic elements of linear and nonlinear modeling approaches are provided, with emphasis on modeling strategies for RC frames, including beam-column joints and members controlled by shear. Brief notes on special elements/materials/commands are provided, too, including example modeling approaches for base isolation systems, nonstructural masonry infill elements, and element removal for progressive collapse simulation. Finally, the main commands for the analysis of structural response under seismic action are illustrated, i.e. eigen, nonlinear static and nonlinear dynamic analysis, and corresponding output analysis.

Mode

Blended

Dates

21 to 24 January 2025, from 9:30 to 12:30 (theory lessons) and from 14:30 to 17:30 (practice lessons)

27 January 2025, from 9:30 to 12:30 (final exam)

Final exam

Written exam with short text answers on theorical and practical (within OpenSees framework) modeling issues

NB

Every student should have a laptop for practice lessons