Mathematical Institute of the Serbian Academy of Sciences and Arts

Seminar

Mechanics of Machines and Mechanisms - Models and Mathematical Methods

http://www.mi.sanu.ac.rs/novi_sajt/research/seminars/mechanics_machines_mechanisms.php

---

Program –oktobar, 2023.

Tuesday, October 10, 2023, at 12h, MISANU Niš

Dr. Andrija Z. Zorić, Faculty of Civil Engineering and Architecture, University of Nis, Serbia

STEEL HYSTERESIS SEISMIC ENERGY DISSIPATION DEVICES
- MECHANICAL PROPERTIES OF HYSTERESIS DAMPERS WITH ROD ELEMENTS OF CIRCULAR CROSS-SECTION

The impacts of earthquakes are dominant in design of structures in seismic active areas. During the earthquakes, damage of the structural and non-structural elements can be caused, as well as the collapse of the structure. This results not only in huge material costs, but also in invaluable loss of human lives. That is why the seismic protection of buildings and the design of earthquake resistant buildings are very current fields of research in the 20th and 21st century.

Earthquake resistant buildings can be achieved by applying modern vibration control systems. One group of these systems is represented by passive vibration control systems, whose advantage is reflected in the fact that they do not require an external energy source for their operation. Within the passive systems for vibration control, there are two groups of devices: a) seismic isolation devices; b) energy dissipation devices. The application of seismic isolation devices changes the dynamic characteristics of the structure, whereby the intensity of seismic forces decreases, while the displacements of the structure during an earthquake increase. Seismic energy dissipation devices increase the damping of the dynamic system of the structure and reduce the displacements of the structure. Consequently, a lower level of ductile behaviour of structural elements is required compared to conventionally designed structures. Hysteresis steel dampers represent a significant group of energy dissipation devices. These dampers are characterized by stable hysteresis behaviour, relatively resistant to changes in ambient temperature, which is their advantage over the other devices.

The dynamic analysis of the structures where hysteresis dissipators of seismic energy are applied requires the definition of their mechanical properties. The mechanical properties of the dampers can be defined by appropriate experimental and numerical research, but for their practical application, it is necessary to define adequate analytical models. As a part of the lecture, in addition to an overview of modern structural vibration control systems, analytical models for defining the mechanical properties of a separate group of steel hysteresis dampers in which seismic energy is dissipated by the inelastic hysteresis behaviour of rod elements with a circular cross-section will be presented.

Tuesday, October 24, 2023, at 17h, room 301f

Dr. Zoran Jelić, College of Engineering, Swansea University, UK

GROUND SOURCE HEATING AND COOLING SYSTEM - INNOVATIVE APPROACH FOR INSTALLATION OF HEAT PUMP GROUND SOURCE HEAT EXCHANGERS IN HISTORICAL URBAN AREAS OF CENTRAL LONDON

High efficiency Heat Pumps Heating and Cooling systems rely on a ground source heat exchangers that are buried in the ground. Usually, heat exchanger comprises either horizontally or vertically buried pipes for extracting heat from the ground. Horizontal installation requires digging a trench and burying a flexible pipe. Such installation is very labour intensive and requires large areas of land.

Vertical heat exchanger pipes for a ground source heating system have conventionally been installed by drilling a hole, then lowering a U-tube into the hole. The drilling operation, as well as being noisy, time consuming and expensive, is messy as it brings large amounts of debris to the surface. For installation in historic, high density population areas of Central London, the novel method of installation of ground source - vertical heat exchanger is devised, using unconventional drilling methods.

October 02, 2023.

The chair
dr Ivana Atanasovska,
Full Research Professor
Mathematical Institute SANU