

Dear Colleagues, we would like to invite you to visit the lecture presented by:

Dr. Ivan Tomac
University of Split - FESB

on the topic of:

Experimental Modal Analysis of Structures Using High Speed Camera

Date: November 21, 2024 (Thursday) at 14.30-15.00

Location: Room No. 623, 6th floor, FME, CTU in Prague, Technická 4, Prague 6

Abstract: *The identification of modal parameters in mechanical engineering plays an important role in dynamically excited structures. Today's trend for designing lighter structures that need to withstand dynamic loads, with a focus on vibration fatigue, puts more emphasis on dynamic parameters of the structure. Knowledge of natural frequencies, damping ratios, and mode shapes serves in the design phase during numerical modelling of the dynamic response of the structure, as well as during exploitation for verification purposes. The identification of modal parameters is performed from signals collected using sensors on the structure (accelerometers, strain-gauges, etc.). Therefore, a direct contact with the structure is necessary, including connecting the sensors to cables and an acquisition device. This is limited to a certain number of positions. Increasing the number of measurement positions further complicates the measuring system. Achieving a high spatial resolution is not possible.*

The emergence on the market of highspeed cameras at relatively affordable prices, along with increasing computer capabilities, enabled to identify vibrational motion of structures from high-speed video recordings. Fast cameras offer non-contact measurement of the response of the structure from large distances with relatively simple setup. Almost every pixel can serve as a displacement sensor. Measuring the full-field structural response provides the possibility of identifying local changes on the structure due to actual dynamic loading. However, measuring the response of structures from video recordings poses many challenges, making it an area of intense research. The focus of this presentation is to show the possibilities of using pixels on images as displacement sensors from which modal parameters can be directly identified. The methodology will be presented on an experimental example. Highspeed cameras can be applied for measuring the response of various structures under dynamic loading, such as bridges, wind turbines, and components of more complex systems like cars, household appliances, etc.



**IVAN
TOMAC**

Assoc. Prof. at the Fac. of Mech. Engng. at the University of Split. He focuses on the identification of modal parameters using advanced signal processing methods such as continuous wave transformation. In 2020, he was awarded a MS-C fellowship by the EC, as part of which he is going to postdoctoral leave for two years at the University of Ljubljana to work on the NOSTRADAMUS project (101027829). Areas of scientific interests are: modal identification, signal and image processing (optical flow and digital image correlation), dynamics of structures and rotors, finite element method.

The lecture will be presented in English. The entry to the lecture is for free. Due to a limited number of seats, the attendants should apply to it by Jan Papuga (papuga@pragtic.com). In case too many unregistered attendants will come, the registered participants will have priority to enter the room.

On behalf of FME CTU and CSM committee:



Prof. M. Růžička

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