Call for application for research scholarships

for post-graduate international candidates

RESEARCH PROJECT N. 62

Title

Analysis of Model Order Reduction of contact interfaces for large systems

Scientific responsible (name, surname, role)

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Short description of the research activity (max 250 words)

Complex mechanical systems are the result of the assembly of many parts. Each contact interface between parts represents a source of uncertainty that greatly affects the dynamic response of the system and the stress distribution. For a correct determination of the fatigue safety margins it is important to control such uncertainty at design stage starting from the proper knowledge of sticking-slipping phenomena at the contacts during vibration cycles. Within this frame the project will focus on the efficient modelling of the non-linear contact surface behavior in terms of a reduced set of information of the contact kinematics and contact parameters being still representative of their effect on the general dynamic response. The linear FE model of the single parts are first considered and the best reduction techniques are sought according to a first classification of localized (concentrated joints) and distributed (bolted flanges) contacts. Reduced Order Model (ROM) are obtained by implementing the formulation in codes developed specifically for this purpose. In particular, the study will be developed studying a turbomachinery system for aeronautical application. In particular, the turbine module will be the reference test case since it includes small (blade to blade contacts) and distributed (flanges between disk stages) contacts where ROMs will be tested. Experimental tests with dummy systems are possible for validation of the study at intermediate stages.

Specific requirements (experiences, skills)

Preferably: Deep understanding of vibration mechanics and machine design, knowledge of programming code Matlab, knowledge of Finite Element software for modal analysis and forced response calculations.

Website of the research group (if any)

www.aermec-dimec.polito.it

Keywords (min 3, max 6)

Vibrations, damping, friction, contacts, turbine, FEM

Research Area (max 1)

Mechanics and Aerospace