

**Call for application for research scholarships  
for post-graduate international candidates**

**RESEARCH PROJECT N. 59**

<b>Title</b>
Advanced techniques for Structural Health Monitoring and Diagnostics applied to Aerospace Engineering
<b>Scientific responsible (name, surname, role)</b>
Cecilia Surace, Associate Professor DISEG ( <a href="mailto:cecilia.surace@polito.it">cecilia.surace@polito.it</a> )
<b>Short description of the research activity (max 250 words)</b>
<p>Structural Health Monitoring (SHM) has been applied in the Aerospace Engineering domain since the late 1970s for civilian and defence applications. Crucially SHM has contributed to developing systems that are now accepted standards in both aeronautical and space practices, such as the Health and Usage Monitoring Systems (HUMS) deployed for main rotor and gearbox components on large rotorcrafts and availed by the Federal Aviation Administration (FAA) and the Civilian Aviation Authority (CAA), the Space Shuttle Modal Inspection System programme (SMIS) defined by the NASA, and several Space Station applications.</p> <p>Apart from the obvious safety aspects, SHM can provide significant economic advantages, such as preventing unnecessary dismantling/reassembling routines for military and civilian operators alike. Correspondingly, the Research Group is currently focused on developing new, efficient monitoring alternatives, as well as on combining existent techniques in robust, automatic SHM systems. The research activities will be focused primarily on investigating novel techniques and approaches in order to perform damage detection, localisation, estimation and assessment, exploiting vibrational methods, also in harsh environmental conditions. These techniques will include, but not be limited to, tools from various fields including advanced Signal Processing, Nonlinear System Identification, and Experimental Modal Analysis which are each relatively well established also in terms of practical application. The Propagation of Uncertainties, Finite-Element Model Updating and Reduction will also be applied to simulate numerically the expected behaviour of damaged structural components, also taking into account uncertainties due to material flaws and the manufacturing processes.</p>
<b>Specific requirements (experiences, skills)</b>
Preferably: Knowledge of structural dynamics, proficiency in Matlab and FEM software, analytical and problem solving skills.
<b>Website of the research group (if any)</b>
<b>Keywords (min 3, max 6)</b>
Structural Health Monitoring, Damage Detection, Vibrations. FEM, Uncertainties.
<b>Research Area (max 1)</b>

Mechanics and Aerospace