

## **Robustness Index and Structural Monitoring**

**Sara Casciati <sup>1)</sup>, Fabio Casciati <sup>2)</sup>, and Lucia Faravelli <sup>2)</sup>**

<sup>1)</sup>Assistant Professor, ASTRA Department, University of Catania  
via delle Maestranze 99, 96100 Siracusa, Italy. Email: saracasciati@msn.com

<sup>2)</sup>Professor, Department of Structural Mechanics, University of Pavia  
via Ferrata 1, 27100 Pavia, Italy. Email: fabio@dipmec.unipv.it, lucia@dipmec.unipv.it

### **Abstract**

In the space of design variables, a cost function is defined whose value must either be constant or fall within an assigned range. Also a set of scenarios against which robustness should be assessed is introduced. The result will be a robustness index dependent on both the given range of design costs and the given aggression scenarios.

By adopting a Differential Evolution (DE) genetic algorithm, the zero-one (survival-failure) domains are identified in the space of the design variables. Each feasible solution, i.e., any structural design of acceptable cost satisfying the safety requirement, will then be associated with a robustness index.

A numerical example is discussed in order to explain the computational details of the proposed method. The optional availability of a monitoring system is also incorporated.