

Summary Report: VKI Lecture: Robust design , Self Organizing Maps and Applications in Aeronautics/Turbomachinery

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Keywords:

Uncertainties analysis, adaptive response surfaces, Self Organizing Maps, Multi Objective Approach.

Objectives :

Report on the VKI Lecture “Robust design , Self Organizing Maps and Applications in Aeronautics/Turbomachinery”

Applications :

This report highlights some new numerical theories about the uncertainties analysis in aeronautics and turbomachinery. We demonstrate that when the design is affected by uncertainties, the accurate approach is based on Multi Objective Theory. To minimize the total number of high fidelity simulations, an adaptive response surfaces is presented.

Results:

The developed methodology has been used for the design of simple axial symmetric geometries, and for a complete transonic design of two dimensional airfoils. A new approach for geometrical uncertainties analysis has been presented.

Illustrations

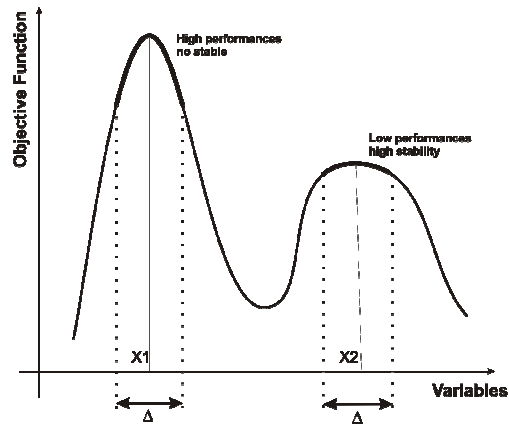


Figure 1: Function with two different extremes: x_1 absolute no stable extreme, x_2 relative stable extreme

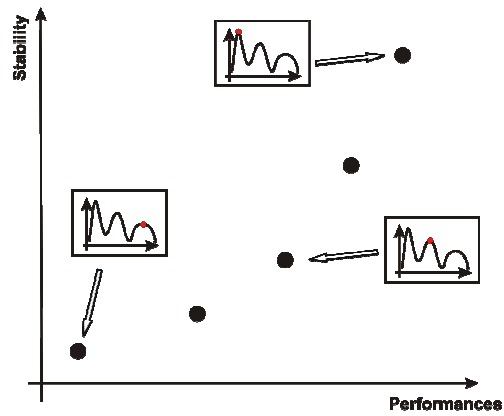


Figure 1: Pareto Frontier obtained by Robust Design Optimization (Performances vs. Stability Degradation)