10th World Congress on Structural and Multidisciplinary Optimization
May 19 -24, 2013, Orlando, Florida, USA

A MinMax Framework for Robust Design Optimization

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1. Abstract
Presented in the paper is a comprehensive methodology to cast and deploy moment-based Robust Design Optimization. Robust objectives and constraints can be formulated by means of worst-case bounds on two risk metrics, i.e. quantile and tail conditional expectation of the output distributions. Such bounds can then be refined on the basis of partial knowledge available for the specific problem at hand or by adding higher moment information. The required output moments are estimated by two related reduced quadrature techniques, which use the first four moments of the input distributions. As demonstrated by means of an aircraft sizing test case, the methodology is of immediate implementation and deployment, and features a convenient trade-off in cost and accuracy. It is therefore thought to be very promising for industrial applications.

2. Keywords: Robust Design Optimization, Chebyshev Inequalities.

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