

Efficient uncertainty analysis in industrial virtual product development

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Keywords: *Sensitivity analysis, multi-criteria optimization, robustness analysis, reliability analysis*

Abstract

Methods of uncertainty treatment and uncertainty analysis become more and more important in virtual product development. In the last decade especially robustness, reliability and sensitivity analysis as well as robust design optimization have received an increasing interest and acceptance e.g. in automotive industry. Since ten years Dynardo develops software which helps to introduce uncertainty analysis in CAE-based product development. In our experience the key of a successful propagation of such methods is that the application of generally complex algorithms is simplified as much as possible. This is realized in our products [optiSLang, 2011] with robust highly automatized algorithmic frameworks together with wizard based algorithmic settings which enable the beginner and even the expert to successfully apply the methods for a broad array of applications.

In the paper this concept is explained in detail by means of sensitivity and robustness analyzes [Most and Will, 2008]. Several industrial applications from automotive industry are discussed [Will et al., 2004, Will and Frank, 2008, Nunes et al., 2009], where uncertainty analysis was successfully applied and where it was introduced meanwhile as state of the art in virtual product development.

References

- T. Most and J. Will. Metamodel of Optimal Prognosis - an automatic approach for variable reduction and optimal metamodel selection. In *Proc. Weimarer Optimierungs- und Stochastiktag 5.0, Weimar, Germany, November 20-21, 2008*. 2008.
- R. Nunes, J. Will, V. Bayer, and K. Chittepu. Robustness evaluation of brake systems concerned to squeal noise problem. In *Proc. Weimarer Optimierungs- und Stochastiktag 6.0, Weimar, Germany*. 2009.
- optiSLang. *The optimizing Structural Language, An Users' Manual*. Dynardo GmbH, Weimar, Germany, version 3.2.1 edition, 2011.
- J. Will and T. Frank. Numerical robustness analysis of crash load cases at the daimler ag. In *Proc. Weimarer Optimierungs- und Stochastiktag 5.0, Weimar, Germany*. 2008.
- J. Will, J.-S. Möller, and E. Bauer. Robustness evaluations of the NVH comfort using full vehicle models by means of stochastic analysis. In *Proc. VDI Congress Berechnung und Simulation im Fahrzeugbau, VDI-Berichte 1846*, pages 505–525. 2004.