INFORMATION-GAP ANALYSIS IN SUPPORT OF PREDICTIVE ACCURACY ASSESSMENT

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Relying on numerical simulations, as opposed to field measurements, to analyze the structural response of complex systems requires that the predictive accuracy of the models be assessed. This activity is generally known as model "validation."

In this work we focus on one aspect of model validation that consists in assessing the robustness of a decision to uncertainty. In this context "decision" refers to assessing the accuracy of predictions and verifying that the accuracy is adequate for the purpose intended. Likewise "uncertainty" can represent experimental variability, variability of the model's parameters but also inappropriate modeling rules in regions of the design / operational space where experiments are not available.

An alternative to the theory of probability is applied to the problem of assessing the robustness of model predictions to sources of uncertainty. The analysis technique is based on the theory of information-gap, which models the clustering of uncertain events in embedded convex sets instead of assuming a probability structure [1,2]. Examples are discussed of performing uncertainty analyses through the general framework of information-gap to assess the predictive accuracy of numerical simulations.

References

[1] Ben Haim, Y., **Information Gap Decision Theory: Decisions Under Severe Uncertainty**, Academic Press Publishers, 2001.

[2] Vinot, P., Cogan, S., Ben Haim, Y., "Reliability of Structural Dynamics Models Based on Info-gap Models," *20th SEM International Modal Analysis Conference*, Los Angeles, California, February 4-7, 2002, pp. 1057-1063.