Verification and validation for fast simulation of acoustics and electro-magnetics including data assimilation

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Verification and Validation (V&V) techiques are necessary to assess reliability of both model and numerical approximation. In the Validation process, both the model and the measurements are subject to uncertainties and have to be taken into account in the quantification of the error. The resolution of problems related to V&V techinques involves a large number of parameters describing uncertainty and in this regard reduced order models (ROM) are a great help because they avoid the so-called *curse of dimensionality*.

In this work we develop and compare different methods able to estimate the V&V error in a parametrized ROM —the Proper Generalized Decomposition (PGD) [1]— solution for equilibrium engineering problems. The research includes both an error estimation in the *computational vademecums* provided by PGD and a model adaptation via data assimilation in the *vademecum* (i.e. *parameter identification* [2] and *Bayesian updating* [3]).

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