

Non-deterministic model updating and health monitoring with uncertainty treatment

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Model Updating has been developed as a typical technique to calibrate the parameters or the numerical model itself such that to tune its prediction as close as possible to the experimental measurements. One of the featured applications of the numerical model is Structural Health Monitoring, which has benefitted from precise models to identify and localize the damage by monitoring the change of key properties of the structural system.

However, it is widely recognized that the unavoidable uncertainties in both operational experiments and numerical analyses require efforts to be dedicated to model updating and health monitoring. Non-deterministic modelling approaches enable characterization, propagation, and quantification of the inevitable uncertainties, providing predictions over a possible range of outcomes (distributional, interval, fuzzy, etc.) rather than a unique solution with maximum fidelity to a single experiment.

This mini-symposium is dedicated to gathering experts from both academia and industries to summarize the latest development in the non-deterministic approaches for numerical modelling and structure health monitoring. Contributions addressing stochastic model updating, system identification, damage localization, sensor placement optimization, and uncertainty quantification are highly welcomed.

Topics of interest include (but are not limited to) the following themes:

- Stochastic model updating
- Finite element analysis
- Health monitoring
- Damage localization
- Uncertainty propagation/quantification
- Experimental modal analysis
- Parameter identification
- Model verification and validation