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VERIFICATION AND VALIDATION OF STRUCTURAL AND FLUID MECHANICS MODELS

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ABSTRACT

The use of mathematical models to represent physical processes has become common in structural and fluid mechanics applications. Despite being distinct areas of mechanical engineering, these two fields face the same challenges regarding the use of mathematical models: the selected formulation should have an adequate modelling accuracy for the intended application; the numerical errors resulting from the methods used to discretize and resolve the governing equations should be controlled (reduced to acceptable levels); and the simulation time of any non-stationary process has to be sufficiently large to converge the statistics. Therefore, whether it is a Finite Element Bending Model or a Direct Numerical Simulation, any numerical simulation requires the evaluation of numerical and modelling errors, i.e. it requires the execution of Verification and Validation exercises [1].

The participants of this session are invited to submit a paper about the Validation of mathematical models for canonical and engineering problems. Naturally, the quantification of modelling errors should be complemented with the assessment of discretization, iterative, and statistical errors. Therefore, it is recommended the execution of studies to estimate numerical uncertainties [2], statistical uncertainties due to the convergence of non-stationary processes [3], and modelling errors with single and multiple data points techniques [4, 5]. The participants interested in using the tools previously cited should contact the session corresponding organizer.

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