VERIFICATION, VALIDATION AND UNCERTAINTY QUANTIFICATION IN MODELING AND SIMULATION

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L. EÇA[*], F.S.PEREIRA[†], K.DOWDING[+] AND M.PAGANO[‡]

[*] Instituto Superior Técnico, ULisbon
Av. Rovisco Pais 1, 1049-001 Lisboa, Portugal
luis.eca@tecnico.ulisboa.pt

[†] Los Alamos National Laboratory
P.O. Box 1663, Los Alamos, NM87545, U.S.A.
fspereira@lanl.gov

[+] Sandia National Laboratories
P.O. Box 5800, Albuquerque, NM 87185, U.S.A.
kjdowdi@sandia.gov

[‡] ASME
2 Park Avenue, New York, NY 10016, U.S.A.
PaganoM@asme.org

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ABSTRACT

Nowadays, modelling and simulation is common practice in engineering and its results may be important for making decisions. Therefore, the credibility of the results obtained must be assessed. In the numerical solution of physics based models, which are the most usual in Computational Solid Mechanics (CSM) and Computational Fluid Dynamics (CFD), verification, validation and uncertainty quantification (VVUQ) are the activities that allow to establish the credibility of modelling and simulation [1,2]. Several organizations, as for example ASME [1-6], AIAA [7] and NAFEMS [8] have published documents about best practices in VVUQ that can help engineering practitioners to apply VVUQ and understand its benefits.

The proposed Mini-Symposium will address many aspects of verification, validation and uncertainty quantification based upon the contributed abstracts. The following topics are suggested by the organizers:

- Standard techniques to perform Code Verification, Solution Verification, Validation and Uncertainty Quantification activities.

- Description and explanation of published VVUQ standards and guides.

- Application of VVUQ techniques to practical engineering problems.

REFERENCES

[1] **ASME V&V10-2019**, Standard for Verification & Validation in Computational Solid Mechanics, The American Society of Mechanical Engineers New York, (2019).

[2] **ASME V&V20-2009,** Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer, The American Society of Mechanical Engineers New York, (2009).

[3] **ASME V&V40-2018,** Assessing Credibility of Computational Modeling Through Verification and Validation: Application to Medical Devices, The American Society of Mechanical Engineers New York, (2018).

[4] **ASME VVUQ1-2022,** Verification, Validation, and Uncertainty Quantification Terminology in Computational Modeling and Simulation, The American Society of Mechanical Engineers New York, (2022).

[5] **ASME VVUQ10.2-2021,** The Role of Uncertainty Quantification in Verification and Validation of Computational Solid Mechanics Models, The American Society of Mechanical Engineers New York, (2021).

[6] **ASME V&V10.1-2012,** An Illustration of the Concepts of Verification and Validation in Computational Solid Mechanics, The American Society of Mechanical Engineers New York, (2012).

[7] **AIAA**, Recommended Practice for Code Verification in Computational Fluid Dynamics, AIAA R-141-2021, (2021).

[8] **NAFEMS,** What is Verification and Validation, Analysis Management Working Group. (2014).