Validation of Numerical Engineering Simulations: Standardisation Actions

Results in Brief

Standardising validation of engineering simulation tools

Simulation is an important tool in the design and manufacture of all engineered products. Scientists have laid the foundations for standardisation of validation protocols for modelling tools to minimise conservative or unreliable designs.

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One of the primary goals of engineered structures from machine tools to bridges is balancing reduced weight, materials usage and energy consumption with adequate safety and reliability. Although computational solid mechanics models abound, they are lacking standardised validation.

Two previous projects, SPOTS and ADVISE, began the standardisation process with calibration procedures for optical techniques for strain measurement that allow measurement uncertainties to be quantified. The EU-funded project 'Validation of numerical engineering simulations: Standardisation actions' (VANESSA) sought to build on those outcomes by establishing a validation methodology within a standards framework. Equally important, the team set goals for encouraging uptake throughout European industrial and scientific communities. After all, a standard is not 'standard' if it is not widely used.

Two international round robin exercises were conducted to evaluate suitability of the chosen reference materials and protocols as tools for engineering standardisation via inter-laboratory comparisons. One addressed the reference materials for the calibration of optical systems for strain field measurement. The second investigated the validation protocol for the computational solid mechanics models.

VANESSA conducted a series of public dialogues open to any interested stakeholders from anywhere in the world through a European Committee for Standardization (CEN) Workshop. Supported by the results of the inter-lab studies, the CEN workshop led to a CEN Workshop Agreement (CWA) on the validation of computational solid mechanics models (CEN CWA16799).

A CWA is not a standard and is not accompanied by national obligations to comply, so the issue of garnering industrial and scientific support is an important one. To address it, VANESSA organised a series of events to exchange information and opinions. The team also created a variety of technical and educational promotional materials that are available on the project website with links to social media sites, including YouTube.

Thanks to the very high level of confidence afforded by validated simulation results, the EU is likely to gain a larger market sector while reducing costs associated with materials and energy usage. Adoption of the technical approach to standardisation of engineering simulation tools is thus expected to have significant impact on the competitive position of EU industry.

Keywords

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VANESSA

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