



SETTING THE STANDARD

Standard for Test Uncertainty

ASME PTC 19.1-2013: Test Uncertainty

This Standard specifies procedures for evaluation of uncertainties in test measurements, parameters and methods, and for propagation of those uncertainties into the uncertainty of a test result. Depending on the application, uncertainty sources may be classified either by the presumed effect (systematic or random) on the measurement or test result, or by the process in which they may be quantified (Type A or Type B). The end result of an uncertainty analysis is a **numerical estimate of the test uncertainty with an appropriate confidence level.**

V&V Standards Committee in Computational Modeling and Simulation

V&V 10 - Verification and
Validation in Computational
Solid Mechanics

V&V 20 - Verification and
Validation in Computational
Fluid Dynamics and Heat
Transfer

V&V 30 - Verification and
Validation in Computational
Simulation of Nuclear System
Thermal Fluids Behavior

V&V 40 - Verification and
Validation in Computational
Modeling of Medical Devices

V&V 50 - Verification and
Validation in Computational
Modeling for Advanced
Manufacturing

Standards committee formed
in 2010

Subcommittees formed:

V&V 10 – 2001

V&V 20 – 2004

V&V 30 – 2010

V&V 40 – 2011

V&V 50 – 2016

V&V Standards Committee

Charter: Coordinate, promote, and foster the development of standards that provide procedures for assessing and quantifying the accuracy and credibility of computational models and simulations.

Chair: Tina Morrison, FDA

Vice-Chair: Ben Thacker, SwRI

Secretary: Ryan Crane, ASME [craner@asme.org]

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- Dawn Bardot, Medical Device Innovation Consortium
- Kevin Dowding, Sandia National Lab
- Marc Horner, Ansys
- Hyung Lee, Bettis Laboratory
- David Moorcroft, FAA
- Richard Schultz, Consultant
- Christopher Freitas, SwRI
- Scott Doebling, LANL

Contributing Member:

- Ashley Emery, Univ. Of Washington

Document underway: V&V 1: Guide to Verification, Validation, and Uncertainty Concepts and the Application of ASME Standards



V&V 10: V&V for Computational Solid Mechanics

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- Tom Paez, Consultant
- Ramesh Rebba, General Motors
- Chris Rogers, Consultant
- John Schultze, LANL

V&V 10 Current and Future Standards

- **V&V 10-2006** - Guide for Verification and Validation in Computational Solid Mechanics – **Revision underway**
- **V&V 10.1-2012** - An Illustration of the Concepts of Verification and Validation in Computational Solid Mechanics
- Draft V&V 10.2 - Role of Uncertainty Quantification in Verification and Validation of Computational Solid Mechanics Models – **Underway**
- Draft V&V 10.3 - Role of Validation Metrics in Verification and Validation of Computational Solid Mechanics Models – **Underway**
- V&V 10.X – Value of V&V for Decision Making - **Planned**
- V&V 10.4 - Role of Verification Methods - **Planned**

V&V 20: V&V for Computational Fluid Dynamics and Heat Transfer

Chair: Dawn Bardot, Medical Device Innovation Consortium

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- Nima Fathi, Research Assistant
- Richard Hills, Sandia
- Brian James, Southern California Edison
- Roger Logan, Consultant
- Patrick Roache, Consultant

V&V 20 Current and Future Standards

- **ASME V&V 20-2009** - Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer
- Draft V&V 20.1 - Multivariate Metrics - Supplement 1 of ASME V&V 20 - Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer
- Draft V&V 20.2 - Simulation at an Application Point - Supplement 2 of ASME V&V 20 - Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer

V&V 30: V&V for Computational Simulation of Nuclear System Thermal Fluids Behavior

Chair: Hyung Lee, Bettis Laboratory

Vice-Chair: Richard Schultz, Consultant

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- Milorad Dzodzo, Westinghouse
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- Arthur Ruggles, Univ. of Tennessee
- Brian Woods, Oregon State Univ.
- Abdelghani Zigh, US NRC

Contributing Member:

- Lewis Lommers, Areva

Draft V&V 30 - Standard for Verification and Validation of System Analysis and Computational Fluid Dynamics Software for Nuclear Applications



V&V 40: V&V for Computational Modeling of Medical Devices

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- Chloe Funkhouser, Baxter Healthcare Corporation
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- Mark Goodin, Simutech Group
- Ismail Guler, Boston Scientific Corporation
- Atul Gupta, Google

Draft V&V 40 - Assessing Credibility of Computational Modeling and through Verification and Validation: Application to Medical Devices

- Prasanna Hariharan, FDA
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- Hui Jin, Medtronic
- Ali Kiapour, 4WEB Medical Inc.
- Linda Knudsen, Synchroness
- Sanjeev Kulkarni, VEXTEC Corporation
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- Paul Tomaszewski, Depuy Orthopaedics Inc
- Tianwen Zhao, Edwards Lifesciences
- Arun U. Nair, BD
- Nuno Rebelo, Dassault Systemes

V&V 50: V&V for Computational Modeling for Advanced Manufacturing

Chair: Sudaran Rachuri, DOE

Vice-Chair: Mark Benedict, AFRL

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Charter: To provide procedures for verification, validation, and uncertainty quantification in modeling and computational simulation for advanced manufacturing.*

*Advanced Manufacturing, as defined in the PCAST report:

“Advanced manufacturing is a family of activities that (a) depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or (b) make use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences, for example nanotechnology, chemistry, and biology. It involves both new ways to manufacture existing products, and the manufacture of new products emerging from new advanced technologies.”

—President’s Council of Advisors on Science and Technology Report to the President on Ensuring American Leadership in Advanced Manufacturing



ASME V&V Symposium

Annual (May) symposium includes plenary sessions and paper presentations on verification, validation, and uncertainty quantification across multiple fields of computational mechanics

<https://www.asme.org/events/vandv/about>

- 2016 was the 5th symposium, 125 accepted presentations and ~200 registered attendees
- Preconference activities include technical training seminars and V&V standards development committee meetings
- Evening networking reception added in 2016

ASME Journal of Verification, Validation and Uncertainty Quantification



This quarterly journal is intended to be a vehicle for disseminating original and applied research, illustrative examples, and high-quality validation experiments and data in the field of verification, validation and uncertainty quantification of computational models in all areas of engineering and applied science. Papers that address any aspect of the V&V process, as well as the interpolation or extrapolation of the results to the model use context are of interest.

- Vol. 1, Issue 1 – March 2016, Sandia Challenge Problem
- Vol. 1, Issue 2 – June 2016, 8 papers
- Vol. 1, Issue 3 – In Progress, currently 5 papers
- <http://verification.asmedigitalcollection.asme.org/issue.aspx>

ASME Journal of Verification, Validation and Uncertainty Quantification



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