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.
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]

**Members:**
- 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

Chair: David Moorcroft, FAA
Vice-Chair: Jim O'Daniel, US Army COE
Secretary: April Amaral, ASME [amarala@asme.org]

Members:
- Mark Anderson, LANL
- Sez Atamturktur, Clemson Univ.
- Mark Benedict, AFRL
- Brett Benowitz, Weidlinger Assoc.
- Bob Ferencz, LLNL
- Leonid Gutkin, Kinectrics Inc.
- Henry Hsieh, LLNL
- Hans Mair, Johns Hopkins Univ. APL
- William Oberkampf, Consultant
- George Orient, SNL
- Michael Shields, Johns Hopkins Univ.
- Kirubel Teferra, Johns Hopkins Univ.
- Ben Thacker, SwRI
- Walt Witkowski, SNL

Contributing Members:
- Scott Doebling, LANL
- Tim Hasselman, ACTA Inc.
- Xiaomo Jiang, General Electric
- Samuel Khor, ANSYS Inc.
- Roger Logan, Consultant
- Tom Paez, Consultant
- Ramesh Rebba, General Motors
- Chris Rogers, Consultant
- John Schultze, LANL
V&V 10 Current and Future Standards

- **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
Vice-Chair: Leonard Peltier, Bechtel National, Inc
Secretary: Marian Heller, ASME [HellerME@asme.org]

Members:
• Arnaud Barthet, EDF
• Ismail Celik, WVU
• Hugh Coleman, University of Alabama Huntsville
• Kevin Dowding, Sandia
• Luis Eca, IST
• Christopher Freitas, SwRI
• Urmila Ghia, University of Cincinnati
• Badri Hiriyur, Weidlinger
• William Ryder, Sandia
• Christopher Roy, VT
• W. Glenn Steele Jr, Mississippi State
• Dimitrios Tselepidakis, Ansys
• Kaveh Zamani, UC Davis

Contributing Members:
• 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 20.2 - 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
Secretary: Ryan Crane, ASME [craner@asme.org]

Members:
• Stephen Bajorek, US NRC
• Francesco D'auria, Universita Degli Studi Di Pisa
• Nam Truc Dinh, UNCSU
• Milorad Dzodzo, Westinghouse
• Christopher Freitas, SwRI
• Yassin Hassan, Texas A&M
• Joshua Kaizer, US NRC
• Koji Okamoto, Univ. of Tokyo
• Upendra Rohatgi, Brookhaven National Lab
• Arthur Ruggles, Univ. of Tennesse
• Brian Woods, Oregan 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
Draft V&V 40 - Assessing Credibility of Computational Modeling and through Verification and Validation: Application to Medical Devices

- Prasanna Hariharan, FDA
- Windi Hary, Heartflow
- Hui Jin, Medtronic
- Ali Kiapour, 4WEB Medical Inc.
- Linda Knudsen, Syncroness
- Sanjeev Kulkarni, VEXTEC Corporation
- Danny Levine, Zimmer Biomet
- XueMei Li, Cook Research Inc
- Xiangyi (Cheryl) Liu, Stryker Orthopaedics
- Brandon A. Lurie, Univ. Michigan
- Ruxi Marinescu, Smith & Nephew
- Julian Mast, Hill-Rom, Inc.
- Lealem Mulugeta, Consultant
- William A. Olson, Ethicon Endo-surgery
- Andrew C. Rau, Exponent, Inc.
- Timothy L. Rossman, Mayo Clinic
- Payman Saffari, Endologix
- Christine Scotti, W.L. Gore
- Richard Swift, Cook Research Inc.
- Paul Tomaszewski, Depuy Orthopaedics Inc
- Tianwen Zhao, Edwards Lifesciences
- Arun U. Nair, BD
- Nuno Rebelo, Dassault Systemes

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

Chair: Tina Morrison, FDA
Vice-Chairs: Jeffery Bischoff, Marc Horner, Carl Popelar
Secretary: Ryan Crane, ASME [craner@asme.org]
V&V 50: V&V for Computational Modeling for Advanced Manufacturing

Chair: Sudaran Rachuri, DOE
Vice-Chair: Mark Benedict, AFRL
Secretary: Marian Heller, ASME [HellerME@asme.org]

Members:
- TBD

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
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](http://verification.asmedigitalcollection.asme.org/issue.aspx)
ASME Journal of Verification, Validation and Uncertainty Quantification

Editor: Ashley Emery, Univ. Of Washington
Internal Sponsors: ASME Heat Transfer and Fluids Engineering Divisions
Associate Editors:
• Sumanta Acharya, Univ. of Memphis
• Dawn Bardot, Medical Device Innovation Consortium
• Jeffery Bischoff, Zimmer
• Hugh Coleman, Univ. of Alabama Huntsville
• Scott Doebling, Los Alamos
• Kevin Dowding, Sandia
• Urmila Ghia, Univ. of Cincinnati
• Marc Horner, Ansys
• David Moorcroft, FAA
• Tina Morrison, FDA
• Leonard Peltier, Bechtel
• William Rider, Sandia
• Patrick Roache, Consultant
• Christopher Roy, VT