ASME® 2021 V&V

Verification & Validation Symposium

CONFERENCE
May 19–20, 2021

Virtual, Online

Program

https://event.asme.org/V-V

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SETTING THE STANDARD

Table of Contents

Dear V&V 2021 participants, authors, and committee members,

We are pleased to welcome you to this year's virtual Validation and Verification Symposium. This year we have a mix of technical papers and technical presentations of very high-quality representing advances in several topics relevant to the field of VVUQ. We have also included several live panels to increase attendee participation. We are especially honored to welcome our keynote speaker Brent Craven, of the U.S. Food and Drug Administration. His presentation is entitled "VVUQ and Regulatory Policies in Medical Devices". We would like to express our sincere appreciation to our Bronze Sponsor, Ansys.

This conference would not have been made possible without our very loyal organizing committee, comprised of dedicated professionals that serve as topic, session organizers and moderators, ensuring all the papers are peer-reviewed on time. This conference could not happen without this group. We are also very grateful for the volunteer support and all the reviewers.

We also acknowledge the great support from ASME staff Kathryn Hyam, Michelle Pagano, Dan Papert, Fred Constantino, Laraine Lee and Kim Williams.

The presentations will be uploaded prior to the conference and you will have access to them by end of day Monday, May 17. Please be sure to check out the Student poster submissions in advance of the Student Q&A Session on Thursday afternoon. Be sure to vote on your favorite.

All registered attendees will have access to the event platform for 90 days after the close of the conference, so if you miss anything, you can go back and check it out.

We hope you enjoy the presentations and the live interactions and look forward to seeing you in person soon.

Sincerely,

Scott Doebling, Conference Chair

ASME® 2021 V&V

All Times EDT	Wednesday May 19, 2021	
9:15AM-9:30AM	**Welcome** **Scott Doebling, V&V Symposium Chair** **Tom Costabile, ASME CEO and Executive Director**	
9:30 AM-10:00 AM	**Live* Keynote Speaker:** **Brent Craven, US FDA** **Topic : VVUQ and Regulatory Policies in Medical Devices**	
10:00 AM-10:30AM	**Plenary Panel Discussion Live*** **Brent Craven US FDA, Windi Hary, HeartFlow, Inc. Marco Viceconti, Università di Bologna, Markus Reiterer, Medtronic, Flora Musuamba Tshinanu, Federal Agency for Medicines and Health Products** **Moderators: Jeff Bischoff, Zimmer Biomet and Marc Horner, ANSYS**	
10:30MM-10:40AM	*Break*	
	Room 1	Room 2
Session 1 10:40AM-12:00PM	**10-01 VVUQ for Biomedical Engineering** **Live Panel*** **Moderators: Marc Horner, ANSYS, Jeff Bischoff, Zimmer Biomet and Payman Afshari, Depuy-Synthes**	07-01 VVUQ for Fluid Dynamics and Heat Transfer Moderator: Brandon Wilson
	VVUQ 40 Verification, Validation, and Uncertainty Quantification in Computational Modeling of Medical Devices Jeff Bischoff, Zimmer Biomet Mark Goodin, Simutech Group Jeremy Rawlinson, Medtronic Spine /Kerim Genc, Simpleware Inc. Julien Clin, Spinologics Inc. /Mark Driscoll, McGill University Cheryl Liu, Stryker Paul Briant, Exponent Inc. Brandon Lurie, W.L. Gore & Associates Brent Craven, US FDA	VVS2021-65256 Bayesian Inference Calibration of Building Energy Models for Arid Weather Author: Danlin Hou
		VVS2021-65325 Asymmetrical Heat Distribution Pattern in Miniature Heat Sinks Due to Conjugate Heat Transfer Author: Mahyar Pourghasemi
		VVS2021-65272 Estimation of Room-Level Cooling Energy in Hot/Arid Climate by Machine Learning-Based Approaches Author: Muath Bani Salim
		VVS2021- 65326 Error Quantification of Nusselt Number Analysis in Miniature Heat Sinks: Verification and Validation Assessment Author: Mahyar Pourghasemi
12:00PM - 12:30PM	*Break*	
Session 2 12:30PM-1:30PM	**10-02 VVUQ for Biomedical Engineering II** **Live Panel [2]***	05-02 Methods for Uncertainty Quantification, Sensitivity Analysis, and Prediction II Moderator: Gowri Srinivasan
	VVUQ 40 Verification, Validation, and Uncertainty Quantification in Computational Modeling of Medical Devices V&V 40 Code Verification Challenge Problem and V&V 40 Calculation Verification Challenge Problems Marc Horner, ANSYS Ismail Guler, Boston Scientific Corporation Nuno Rebelo, Nuno Rebelo Associates LLC	VVS2021- 65291 Multivariate Metric Assessment of the Suitability of Different Rans Turbulence Models for the Simulation of Mini-Channels Cooling Systems for the Fusion Gyrotron Resonator Author: Rosa Difonzo
		VVS2021-65284 Development and Verification of an Integrated Seawater Desalination and Renewable Energy System Model Author: Muath Bani Salim
		VVS2021-65296 Uncertainty in Acoustical Measurements: An Unsettling Perspective Author: Robert Putnam & Richard Peppin
1:30PM-1:30PM	**Wednesday Networking Lunch** **Bring your lunch and come join the conversation.**	
	Topic 1: Biomedical Discussion **Moderator: Kathryn Hyam**	**Topic 2: Methods for UQ discussion** **Moderator: Dan Papert**
1:30PM-2:30PM	**Live Plenary Panel** **VVUQ for Small and Micro Nuclear Reactors - Next Generation of Nuclear Energy** **Speakers : Hans Gougar - X-Energy, Gerhard Strydom - INL, Brian Jackson - Kairos, Robert Martin - BWXT Herman van Antwerpen - X-Energy** **Moderator: Yassin Hassan - Texas A&M University**	
Session 3 2:35PM-4:15PM	02-01 Development and Application of Verification and Validation Standards Moderator: Joshua Kaizer	01-01 Challenge Problem Workshops and Live Panel Session* Moderators: Yassin Hassan and Michelle Pagano
	VVS2021-67648 Proposal for V&V-2: A Common Set of Equations for Verification, Validation, and Uncertainty Quantification Author : Joshua Kaiser	VVS20201- 67160 Simulation of the Second Asme V&V Benchmark Problem: Isothermal Single Jet Author : Sophie Brown
	VVS2021-67764 Primary Stability in Reverse Shoulder Arthroplasty: Model Validation per ASME V&V 40-2018 Standard Author: Mehul Dharia	VVS2021-67949 Non-Isothermal Single-Jet Cfd Numerical Model Validation Using Star-Ccm+ Author: Andrea Zappatore
	VVS2021-68825 Reliability and Repeatability of Strains Measured by Digital Image Correlation for Nitinol Specimen Author: Koray Senol	VVS2021-74957 Temperature Measurements of Plenum to Plenum Natural Circulation of a High Temperature Gas-Cooled Reactors Experiment Facility Author: Anas Alwafi
	VVS2021-65094 A Framework for In Silico Clinical Trials for Medical Devices Using Concepts From Model Verification, Validation, and Uncertainty Quantification (VVUQ) Author: Jeffrey Bodner	
	VVS2021-73011 Comparison of the V&V10.1 and V&V20 Validation Procedures for the V&V10.1 Example Author: Luis Eca	
4:15PM - 4:30PM	**Networking Break** **Topic 1: Nuclear Applications** **Moderator: Michelle Pagano**	**Networking Break** **Topic 2: Standards Development** **Moderator: Kathryn Hyam**
Session 4 4:30PM-5:30PM	05-01 Methods for Uncertainty Quantification, Sensitivity Analysis, and Prediction Moderator: Gowri Srinivasan	12-01 VVUQ for Advance Manufacturing and Computational Electromagnetics, Plasma, Radiation Moderator:Tao Xing
	VVS2021-65073 Extracting Low-Dimensional Features From Field Data for Calibration Author: Kyle Neal	VVS2021-65231 Response Effects Due to Polygonal Representation of Pores in Porous Media Thermal Models Author: Kevin Irick
	VVS2021-65320 Correcting Predictions Using Model Form Error Estimation Author: Kyle Neal	VVS2021-66585 Manufactured Solutions for the Method-of-Moments Implementation of the Electric-Field Integral Equation Author: Brian Freno
	VVS2021-67396 Is Discrete-Direct Model Calibration and Uncertainty Propagation More Trustworthy for Estimating Tail Percentiles and Probabilities Than Bayesian Approaches? Author: Vicente Romero	VVS2021-68039 Geometrically Symmetric Quadrature Rules for Singular Integrals in the Method-of-Moments Implementation of the Electric-Field Integral Equation Author: Brian Freno
Reception 5:30PM - 6:15 PM **The link to join the reception is listed on the event platform**		

ASME® 2021 V&V

Thursday May 20, 2021

	Welcome **Scott Doebling, V&V Symposium Chair**	
9:15AM-10:20AM	**Live Plenary Panel: Topic : VVUQ for Machine Learning** **Moderator: Katie Lewis - Lawrence Livermore National Laboratory, Gowri Srinivasan - Los Alamos National Laboratory** **Panelists : Brian Spears - Lawrence Livermore National Laboratory, Garrison Flynn - Los Alamos National Laboratory** **Bahman Engheta - Medtronic**	
10:20AM-10:35AM	***Break***	
Session 5 10:35AM-11:15AM	**Room 1**	**Room 2**
	15-01 VVUQ for Artificial Intelligence and Machine Learning Models Moderator: Brian Freno	04-01 Verification Methods Moderator: Luis Eca
	VVS2021-65045 Uncertainty Quantification of Deep Neural Network-Based Turbulence Models for Reactor Transient Analysis Author: Yang Liu	VVS2021-67982 Error Transport Equations: Recent Progress and Current Challenges Author: Chris Roy
	VVS2021-65294 Predictive Analytics and Uncertainty Quantification of a Microwave Ablation Simulation With a Spatially Varying Response Author: Gavin Jones	VVS2021-65290 Discretization Error Estimation in Subsonic, Transonic and Supersonic Flows of an Inviscid Fluid Over a Bump Author: Luis Eca
11:15AM-11:40AM	**Networking Break** **Topic 1: Artificial Intelligence** **Moderator: Dan Papert**	**Networking Break** **Topic 2: Verification and Validation Methods** **Moderator: Kathryn Hyam**
Session 6 11:40AM-1:00PM	03-01 Topics in Verification, Validation & Uncertainty Quantification Moderator: Scott Doebling	07-02 VVUQ for Fluid Dynamics and Heat Transfer II Moderator: Kevin Dowding
	VVS2021-65268 Bayesian Calibrating Educational Building Thermal Models to Hourly Indoor Air Temperature: Methodology and Case Study Author: Ibrahim Hassan	VVS2021-67405 Verification & Validation Strategy for Scale-Resolving Simulations of Turbulence Author: Filipe Pereira
	VVS2021-67341 V&V Adjacent Activities, or How People Avoid Doing Quality V&V Author: William Rider	VVS2021-68027 Nonintrusive Manufactured Solutions for Ablation Author: Brian Freno
	VVS2021-67604 A Hierarchical Strategy for Verification, Validation, and Uncertainty Quantification of Modeling 3d Features in Inertial Confinement Fusion Using Xrage Author: Brandon Wilson	VVS2021-68040 Code-Verification Techniques for Hypersonic Reacting Flows in Thermochemical Nonequilibrium Author: Brian Freno
	VVS2021-67977 Communication of Simulation Results Author: William Oberkampf	
1:00PM-1:30PM	**Thursday Student Poster Q&A** **Bring your lunch and come join the conversation** **Moderator: Scott Doebling & Michelle Pagano**	
	VVS2021- 65224 Biomechanical Modeling of Proximal Junctional Failure: Credibility Assessment Following ASME V&V40 Standard Framework Author: Maeva Lopez Ponceles	
	VVS2021-65249 Utilization of Finite Element Analysis for Comparing Rotary Cutter Tooth Designs for Biomass Comminution Rotary Crumbler® Shear Processing Head Author: Misael Ortiz	
	VVS2021-68841 The Role of Calibration Complexity in Predictive Modeling Author: Xinyue Xu	
	VVS2021-68846 Multi-Fidelity Model Calibration With Quantified Uncertainties Author: Sepideh Ebad Sichani	
	VVS2021- 65909 Multi-Dimensional, State-Aware Calibration as Applied to Models of Vibration Isolation Author: Adway Das	
1:30PM-1:40PM	***Break***	
1:40PM-2:40PM	**Live Plenary Panel** **Topic : VVUQ in Higher Education: Preparing the Next Generation of Engineers** **Host : Tao Xing, University of Idaho** **Speakers: Luis Eca - University of Lisbon, Scott Doebling - Los Alamos National Laboratory**	
2:40PM-2:50PM	***Break***	
Session 7 2:50PM-4:30PM	05-01 Validation Methods Moderator : Aaron Koskelo	**Live Panel *** **VVUQ 50 Committee Overview Session**
	VVS2021-66331 Not All Uncertainties Are Created Equal: Re-Visiting the Area Metric Author: Jeffrey Bodner	VVUQ 50 Verification, Validation, and Uncertainty Quantification in Computational Modeling of Advanced Manufacturing VVUQ 50 Model Life Cycle Sudarsan Rachuri, Department of Energy William Schindel, ICTT System Sciences Fred Constantino, ASME
	VVS2021-68044 Linking Material Models Between Codes: Example of a Cerium Taylor Cylinder Author: Joanne Budzien	
	VVS2021-63350 Is Model Validation Valid? Author: George Hazelrigg	
	VVS2021-66544 A Strategy for Utilizing Clinical Data to Achieve and Demonstrate Credibility of Models of Clinical Device Performance Author: Jeffrey Bischoff	

Technical Paper Presentations

VVS2021-65094
A Framework for *In Silico* Clinical Trials for Medical Devices Using Concepts From Model Verification, Validation, and Uncertainty Quantification (VVUQ)
Jeff Bodner — Medtronic plc — Minneapolis, Minnesota, United States
Vikas Kaul — Medtronic plc — Minneapolis, Minnesota, United States

VVS2021-65268
Bayesian Calibrating Educational Building Thermal Models to Hourly Indoor Air Temperature: Methodology and Case Study
*Danlin **Hou*** — Concordia University — Montreal, Quebec, Canada
Chang Shu — Concordia University — Montreal, Quebec, Canada
Lili Ji — Concordia University — Montreal, Quebec, Canada
Ibrahim Galal Hassan — Texas A&M University at Qatar — Doha, Qatar
Liangzhu (Leon) Wang — Concordia University — Montreal, Quebec, Canada

VVS2021-65290
Discretization Error Estimation in Subsonic, Transonic and Supersonic Flows of an Inviscid Fluid Over a Bump
Luís Eça — MARIN Academy — Lisbon, Portugal
Cristiano Silva — IST ULisbon — Lisbon, Portugal
João Muralha — IST ULisbon — Lisbon, Portugal
Christiaan Klaij — MARIN — Wageningen, Netherlands
Serge Toxopeus — MARIN — Wageningen, Netherlands
Martin Hoekstra — Consultant — Wageningen, Netherlands

VVS2021-65284
Development and Verification of an Integrated Seawater Desalination and Renewable Energy System Model
*Muath **Bani Salim*** — Texas A&M University-Kingsville — Kingsville, Texas, United States
*Xuewei **Zhang*** — Texas A&M University-Kingsville — Kingsville, Texas, United States

VVS2021-65256
Bayesian Inference Calibration of Building Energy Models for Arid Weather
Danlin Hou — Concordia University — Montreal, Quebec, Canada
Ibrahim Galal Hassan — Texas A&M University at Qatar — Doha, Qatar
Liangzhu (Leon) Wang — Concordia University — Montreal, Quebec, Canada

VVS2021-65272
Estimation of Room-Level Cooling Energy in Hot/Arid Climate by Machine Learning-Based Approaches
Bingyan Jia — Concordia University — Montreal, Quebec, Canada
Danlin Hou — Concordia University — Montreal, Quebec, Canada
Liangzhu (Leon) Wang — Concordia University — Montreal, Quebec, Canada
Ibrahim Galal Hassan — Texas A&M University at Qatar — Doha, Qatar

VVS2021-65325
Asymmetrical Heat Distribution Pattern in Miniature Heat Sinks Due to Conjugate Heat Transfer
Mahyar Pourghasemi — University of New Mexico — Albuquerque, New Mexico, United States
Nima Fathi — University of New Mexico — Albuquerque, New Mexico, United States

VVS2021-65326
Error Quantification of Nusselt Number Analysis in Miniature Heat Sinks: Verification and Validation Assessment
Mahyar Pourghasemi — University of New Mexico — Albuquerque, New Mexico, United States
Nima Fathi — University of New Mexico — Albuquerque, New Mexico, United States

VVS2021-65231
Response Effects Due to Polygonal Representation of Pores in Porous Media Thermal Models
Kevin W. Irick — Sandia National Laboratories — Albuquerque, New Mexico, United States
Nima Fathi — The University of New Mexico — Albuquerque, New Mexico, United States

VVS2021-65045
Uncertainty Quantification of Deep Neural Network-Based Turbulence Model for Reactor Transient Analysis
Yang Liu — Argonne National Laboratory — Lemont, Illinois, United States
Rui Hu — Argonne National Laboratory — Lemont, Illinois, United States
Prasanna Balaprakash — Argonne National Laboratory — Lemont, Illinois, United States

Technical Presentations Only

VVS2021-65256

Bayesian Inference Calibration of Building Energy Models for Arid Weather, Technical Paper Publication

Danlin Hou - Concordia University
Ibrahim Gaal Hassan - Texas A&M University At Qatar
Liangzhu (Leon) Wang - Concordia University, Montreal, Canada

VVS2021-65325

Asymmetrical Heat Distribution Pattern in Miniature Heat Sinks Due to Conjugate Heat Transfer, Technical Paper Publication

Mahyar Pourghasemi - Mechaniacl Eng Dep, University of New Mexico
Nima Fathi - The University of New Mexico

VVS2021-65272

Estimation of Room-Level Cooling Energy in Hot/arid Climate by Machine Learning-Based Approaches,
Technical Paper Publication

Bingyan Jia - Concordia University
Danlin Hou - Concordia University
Liangzhu (Leon) Wang - Concordia University
Ibrahim Galal Hassan - Texas A&M University At Qatar

VVS2021-65326

Error Quantification of Nusselt Number Analysis in Miniature Heat Sinks: Verification and Validation Assessment,
Technical Paper Publication

Mahyar Pourghasemi - Mechanical Eng Dep, University of New Mexico
Nima Fathi - The University of New Mexico

VVS2021-65291

Multivariate Metric Assessment of the Suitability of Different Rans Turbulence Models for the Simulation of Mini-Channels Cooling Systems for the Fusion Gyrotron Resonator, Technical Presentation Only

Rosa Difonzo - Politecnico di Torino
Andrea Allio - Politecnico di Torino
Laura Savoldi - Politecnico di Torino

VVS2021-65284

Development and Verification of an Integrated Seawater Desalination and Renewable Energy System Model,
Technical Paper Publication
Muath Bani Salim - Texas A&M University-Kingsville
Xuewei Zhang - Texas A&M University-Kingsville

VVS2021-65296

Uncertainty in Acoustical Measurements: An Unsettling Perspective, Technical Presentation Only
Robert Putnam - Retired
Richard Peppin - Retired

VVS2021-68066

Verification Working Group Challenge Problems for Computational Modeling of Medical Devices, Panel
Marc Horner - ANSYS, Inc.
Ismail Guler - Boston Scientific

VVS2021-67160

Simulation of the Second ASME V&V Benchmark Problem: Isothermal Single Jet, Panel
Sophie Brown - Rolls-Royce Plc
Sam Kim - Rolls-Royce Plc
Ryan Tunstall - Rolls-Royce Plc

VVS2021-67949

Non-Isothermal Single-Jet Cfd Numerical Model Validation Using Star-Ccm+Panel
Andrea Zappatore - Politecnico di Torino, Dipartimento Energia
Antonio Froio - Politecnico di Torino, Dipartimento Energia
Roberto Zanino - Politecnico di Torino

VVS2021-74957

Temperature Measurements of Plenum-to-Plenum Natural Circulation of a High Temperature Gas-Cooled Reactors Experiment Facility, Panel
Thien Nguyen - Texas A&M University
N. K. Anand - Texas A&M University
Yassin Hassan - Texas A&M University

VVS2021-67648

Proposal for V&V-2: A Common Set of Equations for Verification, Validation, and Uncertainty Quantification, Technical Presentation Only

Joshua Kaizer - U.S. Nuclear Regulatory Commission

VVS2021-67764

Primary Stability in Reverse Shoulder Arthroplasty: Model Validation per ASME Vv40-2018 Standard, Technical Presentation Only

Mehul Dharia - Zimmer Biomet
Yang Son - Zimmer Biomet

VVS2021-68825

Reliability and Repeatability of Strains Measured by Digital Image Correlation for Nitinol Specimen, Technical Presentation Only

Koray Senol - Edwards Lifesciences
Sakya Tripathy - Edwards Lifesciences
Douglas Dominick - Edwards Lifesciences
Ming Wu - Edwards Lifesciences
Hengchu Cao - Edwards Lifesciences

VVS2021-65094

A Framework for In Silico Clinical Trials for Medical Devices Using Concepts From Model Verification, Validation, and Uncertainty Quantification (VVUQ), Technical Paper Publication

Jeff Bodner - Medtronic
Vikas Kaul – Medtronic

VVS2021-73011

Comparison of the V&V10.1 and V&V20 Validation Procedures for the V&V10.1 Example, Technical Presentation Only

VVS2021-65073

Extracting Low-Dimensional Features From Field Data for Calibration, Technical Presentation Only

Kyle Neal - Vanderbilt University
Benjamin Schroeder - Sandia National Laboratories
Joshua Mullins - Sandia National Laboratories
Brian Carnes - Sandia National Laboratories

VVS2021-65320

Correcting Predictions Using Model Form Error Estimation, Technical Presentation Only
Kyle Neal - Vanderbilt University
Abhinav Subramanian - Vanderbilt University
Sankaran Mahadevan - Vanderbilt University
Joshua Mullins - Sandia National Laboratories
Benjamin Schroeder - Sandia National Laboratories

VVS2021-67396

Is Discrete-Direct Model Calibration and Uncertainty Propagation More Trustworthy for Estimating Tail Percentiles and Probabilities Than Bayesian Approaches? Technical Presentation Only
Vicente Romero - Sandia National Laboratories

VVS2021-65231

Response Effects Due to Polygonal Representation of Pores in Porous Media Thermal Models, Technical Paper Publication
Kevin Irick - Sandia National Laboratories
Nima Fathi - The University of New Mexico

VVS2021-66585

Manufactured Solutions for the Method-of-Moments Implementation of the Electric-Field Integral Equation, Technical Presentation Only
Brian Freno - Sandia National Laboratories
Neil Matula - Sandia National Laboratories
William Johnson - Sandia National Laboratories

VVS2021-68039

Geometrically Symmetric Quadrature Rules for Singular Integrals in the Method-of-Moments Implementation of the Electric-Field Integral Equation, Technical Presentation Only
Brian Freno - Sandia National Laboratories
William Johnson - Sandia National Laboratories
Brian Zinser - Sandia National Laboratories
Donald Wilton - University of Houston
Francesca Vipiana - Politecnico di Torino
Salvatore Campione - Sandia National Laboratories

VVS2021-67982

Error Transport Equations: Recent Progress and Current Challenges, Technical Presentation Only
Chris Roy - Virginia Tech
William Jordan - Virginia Tech
Hongyu Wang - Virginia Tech

VVS2021-65290

Discretization Error Estimation in Subsonic, Transonic and Supersonic Flows of an Inviscid Fluid Over a Bump, Technical Paper Publication

Luis Eca - IST
Cristiano Silva - Instituto Superior Tecnico
Joao Muralha - Instituto Superior Tecnico
Christiaan Klaij - MARIN
Serge Toxopeus - MARIN
Martin Hoekstra – Consultant

VVS2021-65045

Uncertainty Quantification of Deep Neural Network-Based Turbulence Models for Reactor Transient Analysis, Technical Paper Publication

Yang Liu - Argonne National Laboratory
Rui Hu - Argonne National Laboratory
Prasanna Balaprakash - Argonne National Laboratory

VVS2021-65294

Predictive Analytics and Uncertainty Quantification of a Microwave Ablation Simulation With a Spatially Varying Response, Technical Presentation Only

Gavin Jones - SmartUQ

VVS2021-65268

Bayesian Calibrating Educational Building Thermal Models to Hourly Indoor Air Temperature: Methodology and Case Study, Technical Paper Publication

Danlin Hou - Concordia University
Chang Shu - Concordia University
Lili Ji - Concordia University
Ibrahim Hassanqatar - Texas A&M University At Qatar
Liangzhu (Leon) Wang - Concordia University

VVS2021-67341

V&V Adjacent Activities, or How People Avoid Doing Quality V&V, Technical Presentation Only

William Rider - Sandia National Laboratories

VVS2021-67604

A Hierarchical Strategy for Verification, Validation, and Uncertainty Quantification of Modeling 3d Features in Inertial Confinement Fusion Using Xrage, Technical Presentation Only

Brandon Wilson - Los Alamos National Laboratory
Aaron Koskelo - Los Alamos National Laboratory
Jim Ferguson - Los Alamos National Laboratory
Vincent Chiravalle - Los Alamos National Laboratory

VVS2021-67977

Communication of Simulation Results, Technical Presentation Only
William Oberkampf - W L Oberkampf Consulting

VVS2021-67405

Verification & Validation Strategy for Scale-Resolving Simulations of Turbulence, Technical Presentation Only
Filipe S. Pereira - Los Alamos National Laboratory
Fernando F. Grinstein - Los Alamos National Laboratory
Daniel M. Israel - Los Alamos National Laboratory
Luís Eça - Instituto Superior Tecnico

VVS2021-68037

Nonintrusive Manufactured Solutions for Ablation, Technical Presentation Only
Brian Freno - Sandia National Laboratories
Brian Carnes - Sandia National Laboratories
Neil Matula - Sandia National Laboratories

VVS2021-68040

Code-Verification Techniques for Hypersonic Reacting Flows in Thermochemical Nonequilibrium, Technical Presentation Only
Brian Freno - Sandia National Laboratories
Brian Carnes - Sandia National Laboratories
V. Gregory Weirs - Sandia National Laboratories

VVS2021-65224

Biomechanical Modeling of Proximal Junctional Failure: Credibility Assessment Following ASME V&V 40 Standard Framework, Student Poster Presentation
Maeva Lopez Poncelas - Polytechnique Montréal
Luigi La Barbera - Polytechnique Montréal
Jeremy Rawlinson - Medtronic
Dennis Crandall - Sonoran Spine
Carl-Eric Aubin - Polytechnique Montréal

VVS2021-65249

Utilization of Finite Element Analysis for Comparing Rotary Cutter Tooth Designs for Biomass Comminution Rotary Crumbler® Shear Processing Head, Student Poster Presentation
Misael Ortiz - Oak Ridge Institute for Science and Education & Rice University
Lianshan Lin - Oak Ridge National Laboratory

VVS2021-68841

The Role of Calibration Complexity in Predictive Modeling, Student Poster Presentation
Xinyue Xu - The Pennsylvania State University
Roland Platz - The Pennsylvania State University
Sez Atamturktur - The Pennsylvania State University

VVS2021-68846

Multi-Fidelity Model Calibration With Quantified Uncertainties, Student Poster Presentation
Sepideh Ebad Sichani - Penn State
John Nicholson - Clemson University
D. Andrew Brown - Clemson University
Roland Platz - Penn State University
Sez Atamturktur - Penn State University

VVS2021-65909

Multi-Dimensional, State-Aware Calibration as Applied to Models of Vibration Isolation, Student Poster Presentation
Adway Das - Pennsylvania State University
Roland Platz - Pennsylvania State University
Andrew Brown - Clemson University
Sez Atamturktur - Pennsylvania State University

VVS2021-66331

Not All Uncertainties Are Created Equal: Re-Visiting the Area Metric, Technical Presentation Only
Jeffrey Bodner - Medtronic Corp

VVS2021-68044

Linking Material Models Between Codes: Example of a Cerium Taylor Cylinder, Technical Presentation Only
Joanne Budzien - Los Alamos National Laboratory
James Byerly - Los Alamos National Laboratory
Rob Aulwes - Los Alamos National Laboratory
Rao Garimella - Los Alamos National Laboratory
Angela Herring - Los Alamos National Laboratory
Jon Woodring - Los Alamos National Laboratory

VVS2021-63350

Is Model Validation Valid?, Technical Presentation Only
George Hazelrigg - George Mason University

VVS2021-66544

A Strategy for Utilizing Clinical Data to Achieve and Demonstrate Credibility of Models of Clinical Device Performance, Technical Presentation Only

Jeffrey Bischoff - Zimmer Biomet
Mehul Dharia - Zimmer Biomet
Philippe Favre - Zimmer Biomet

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Provides procedures for assessing the correctness and credibility of modeling and simulation in computational solid mechanics.

ASME VVUQ 20 Verification, Validation, and Uncertainty Quantification in Computational Fluid Dynamics and Heat Transfer
Provides procedures for quantifying the accuracy of modeling and simulation in computational fluid dynamics and heat transfer.

ASME VVUQ 30 Verification, Validation, and Uncertainty Quantification in Computational Simulation of Nuclear System Thermal Fluids Behavior
Provides the practices and procedures for verification and validation of software used to calculate nuclear system thermal fluids behavior. The software includes system analysis and computational fluid dynamics, including the coupling of this software.

ASME VVUQ 40 Verification, Validation, and Uncertainty Quantification in Computational Modeling of Medical Devices
Provides procedures to standardize verification and validation for computational modeling of medical devices.

ASME VVUQ 50 Verification, Validation, and Uncertainty Quantification of Computational Modeling for Advanced Manufacturing
To provide procedures for verification, validation, and uncertainty quantification in modeling and computational simulation for advanced manufacturing

ASME VVUQ 60 Verification, Validation, and Uncertainty Quantification of Computational Modeling in Energy Systems
To develop and establish best practice procedures for uncertainty quantification in computational and simulations as applied in non-nuclear energy systems.

ASME VVUQ 70 Verification, Validation, and Uncertainty Quantification of Machine Learning
Coordinate, promote, and foster the development of standards that provide procedures for assessing and quantifying the credibility of machine learning algorithms applied to mechanistic and process modeling.

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Learn terminology, concepts, examples and applications in interactive training seminars and webinars given by VVUQ experts.

Journal of Verification, Validation and Uncertainty Quantification (JVVUQ)
Stay up-to-date on discipline-specific applications, and development and assessment of new methodologies for VVUQ.

V&V Symposium Conference Proceedings and Presentations
View conference proceedings

https://www.asme.org/codes-standards/publications-information/verification-validation-uncertainty

ASME V&V Standards

V&V 10–2019, Standard for Verification and Validation in Computational Solid Mechanics

V&V 10.1–2012, An Illustration of the Concepts of Verification and Validation in Computational Solid Mechanics

V&V 20–2009, Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer

V&V 40–2018, Assessing Credibility of Computational Modeling through Verification and Validation: Application to Medical Devices

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