THWARTS 2019 DETAILED SCHEDULE

MONDAY OCTOBER 14TH

7:30 – 8:00 Breakfast & Opening Remarks

Opening remarks by **Franklin T. Lombardo**

8:00 – 9:00 Keynote Lecture

Chasing Science: Reflections on 45 Years of Storm Intercept.
Erik Rasmussen
Senior Research Scientist, VORTEX-SE Coordinating Scientist, CIMMS NSSL and the University of Oklahoma.

9:00 – 10:30 Technical Session #1: Numerical Model & Simulation

1.1 Hindcasting the damage of Ottawa-Gatineau tornado outbreak of September 2018: a computational fluid and structural mechanics approach
Geleta, T [1], Gairola, A.*[1], and Bitsuamlak. G.T.[1,2]
[1]Department of Civil and Environmental Engineering, and WindEEE Research Institute, UWO; [2]Boundary Layer Wind Tunnel Laboratory, UWO.

1.2 Amplitude of different frequencies in the turbulent wind using Fourier and wavelet analysis
R. Panneer Selvam[1]
[1]BELL 4190, Univeristy of Arkansas, Fayetteville, AR 72701, USA.

1.3 Numerical simulation of a laboratory tornado simulator capable of translation
Ryan Honerkamp*[1] and Guirong Yan[1]
[1]Missouri University of Science and Technology, Rolla, MO 65409, USA.

1.4 High-resolution numerical simulations of the interactions of tornadoes with terrain and buildings
Anthony E. Reinhart*[1,2], David J. Bodine[3], Martin Satrio[3,4], Franklin T. Lombardo[5], and Takashi Maruyama[6]
[1]Cooperative Institute for Mesoscale Meteorological Studies, Norman, OK; [2]National Severe Storms Laboratory, Norman, OK; [3]Advanced Radar Research Center, Norman, OK; [4]School of Meteorology, Norman, OK; [5]University of Illinois at Urbana-Champaign, Urbana, IL; [6]Kyoto University, Kyoto, Japan.

1.5 Effect of few sine waves as inflow turbulence on building peak pressure
Zahra Mansouri*[1] and R. Panneer Selvam[1]
[1]DR.BELL 4190 University of Arkansas, Fayetteville, AR 72701, USA.

1.6 Comparison of tornado wind field with experiment and effect of chamber geometry on vortex touchdown
Sumit Verma*[1] and R. Panneer Selvam[1]
[1]BELL 4190 University of Arkansas, Fayetteville, AR 72701, USA

10:30 – 10:45 Coffee break

10:45 – 12:15 Technical Session #2: Measurement & Observation

2.1 Targeted observations by radar and UAS of supercells (TORUS) 2019: first look
Donald Burgess*[1]
[1]University of Oklahoma CIMMS/NSSL, Norman, OK 73072.

2.2 Statistical evaluation of the relationship between southern-end supercells and tornado production tendencies
Susan L. Beveridge*[1], Jana Lesak Houser[1], and Sara R. Marzola[1]
[1]Ohio University, Athens, OH 45701, USA.

2.3 What about the thermodynamics?
Karen Kosiba*[1] and Josh Wurman[1]
[1]Center for Severe Weather Research, Boulder, Colorado 80305.

2.4 Radar observations of tornadic debris plumes
Ernest J. Ostuno*[1]
[1]NOAA/National Weather Service Forecast Office, Grand Rapids, Michigan.

2.5 Close-range radar observations and high-resolution damage survey of a large, intense tornado in a forested area
Anthony W. Lyza*[1], Barrett T. Goudeau[1], and Kevin R. Knupp[1]
[1]Department of Atmospheric Science, Severe Weather Institute - Radar and Lightning Laboratories, University of Alabama in Huntsville, Huntsville, AL 35805, USA.

2.6 Study of tornado vortex induced loads on attached canopies in low rise buildings
Rajesh Goyal[1], Mohammed Moizuddin*[2], and Masahiro Matsui[3]
[1]National Institute of Construction Management and Research (NICMAR), Delhi NCR Campus, Bahadurgarh-124507, India; [2]Covil Engineering Department, RIMT University, Mandi Gobindgarh-141411, India; [3]Department of Architecture, Tokyo Polytechnic University, Kanagawa 243-0297, Japan.

12:15 – 13:45 Lunch

13:45 – 15:15 Technical Session #3: Measurement & Observation; Community Impact & Planning

3.1 Finding every tornado in Canada – The Northern Tornadoes Project in 2019
David Sills*[1]
[1]Faculty of Engineering, University of Western Ontario, London, ON, Canada.

3.2 Implementing advanced drone techniques on damage surveys
Connell Miller*[1], Gregory Kopp[1], and David Sills[1]
[1]Northern Tornadoes Project, Western University, London, Ontario, Canada.

3.3 Semantic segmentation of aerial SFM point clouds for post windstorm damage assessment
Mohammad Ebrahim Mohammadi[1], Richard L. Wood*[1], and Daniel P. Watson[1]
[1]University of Nebraska-Lincoln, Lincoln, NE 68588-0531, USA.

3.4 Discrete and distributed error assessment of aerial point clouds for post tornado three-dimensional scene reconstruction
Yijun Liao[1] and Richard L. Wood*[1]
[1]University of Nebraska-Lincoln, Lincoln, NE 68588, USA.

3.5 Accelerating post-event data collection and analysis using artificial intelligence
Ali Lenjani*[1], Shirley J. Dyke[1,2], Ilias Bilionis[1], Chul Min Yeum[3], and Arindam Gan Chowdhury[4]
[1]School of Mechanical Engineering, Purdue University, West Lafayette, IN, USA; [2]Lyles School of Civil Engineering, Purdue University, West Lafayette, IN, USA; [3]Department of Civil and Environmental Engineering, University of Waterloo, ON, N2L 3G1, Canada; [4]Department of Civil and Environmental Engineering, Florida International University, Miami, FL, USA.

3.6 Automated approach to mine remote sensing data to support building-level classification of tornado damage and pre-event building characteristics
P. Shane Crawford*[1], Alexander Hainen2, Pataya Scott[1,3], Marc Levitan[1], Judith Mitrani-Reiser[1], and Andrew Graettinger[4]
[1]National Institute of Standards and Technology, Gaithersburg, MD 20899, USA; [2]University of Alabama, Tuscaloosa, AL 35487, USA; [3]Texas Tech University, Lubbock, TX 79409, USA; [4]University of Wisconsin-Milwaukee, Milwaukee, WI 53211, USA.

15:15 – 15:30 Coffee break

15:30 – 16:30 Technical Session #4: Community Impact & Planning; Experimentation

4.1 Modeling behavioral response to tornado hazard messaging: an interdisciplinary application of behavioral economics
Brett W. Gelino*[1], Derek D. Reed[1], Elaina J. Sutley[1], and Franklin T. Lombardo[2]
[1]University of Kansas, Lawrence, KS 66045-7521, USA; [2]University of Illinois at Urbana-Champaign, Urbana, IL 61801-2919, USA.

4.2 Evaluating the socio-technical interactions contributing to wind damage in an artificial neural network model
Stephanie F. Pilkington*[1] and Hussam N. Mahmoud[2]
[1]University of North Carolina at Charlotte, Charlotte, NC 28223, USA; [2]Colorado State University, Fort Collins, CO 80523, USA.

4.3 Community-level resilience assessment of a simulated EF-5 tornado in Joplin using IN-CORE Beta

Lisa Wang*[1], John W. van de Lindt[1], Nathanael Rosenheim[2], Harvey Cutler[3], Jong Sung Lee[4], and Maria Koliou[5]
[1]Department of Civil and Environmental Engineering, Colorado State University, Fort Collins, CO 80521, USA; [2]Hazard Reduction and Recovery Center, College of Architecture, Texas A&M University, College Station, Texas 77843, USA; [3]Department of Economics, Colorado State University, Fort Collins, CO 80521, USA; [4]National Center for Supercomputing Applications (NCSA), University of Illinois at Urbana-Champaign, Champaign 61801, USA; [5]Zachry Department of Civil and Environmental Engineering, Texas A&M University, College Station, TX 77843, USA.

4.4 Which household emergency plans are more helpful in tornadoes? Through the lens of gerontology

Zhen Cong[1] and Daan Liang*[2]
[1]Associate Professor, Associate Dean for Research and Faculty Affairs, School of Social Work, the University of Texas at Arlington, 211 S Cooper St, Arlington, TX 76019; [2]Professor, Department of Civil, Construction and Environmental Engineering, The University of Alabama, 281 Hardaway Hall, Box 870205, Tuscaloosa, AL 35487.

16:30 – 17:00 Break and walk to facility tour

17:00 – 18:00 Facility tour: National Petascale Computing Facility

The tour to the National Petascale Computing Facility will depart from and return to the conference location (iHotel). The location is within walking distance from the iHotel.

19:00 Dinner at Maize at the Station (not included with registration)

We invite THWARTS 2019 attendees to join us for dinner at Maize at the Station (100 N Chestnut St, Champaign, IL 61820). This is an informal event to encourage interactions among attendees. The event is not included with the registration fees and every attendee must pay for their own (dinner at Maize is ~ $15). There will be ride share options from the iHotel which will be announced later, although there is no guarantee of finding a ride there, there are multiple options such as UBER, local taxi and bus. If you are planning to attend this event, please fill out the following google form such that we can know in advance the number of people to expect and reserve enough tables for us. Here is the link: https://forms.gle/Heht5d3NRXgNykqM6

TUESDAY OCTOBER 15TH

8:30 – 9:00 Breakfast

9:00 – 10:30 Roundtable discussion: "Promoting interdisciplinary tornado research"

Roundtable discussion of the entire community
Session chaired by **David B. Roueche**

10:30 – 10:45 Coffee break

10:45 – 12:15 Technical Session #5: Measurement & Observation; Community Impact & Planning

5.1 Damage indicators and wind speed estimation of tornadoes in rural areas
Daniel M. Rhee*[1] and Franklin T. Lombardo[1]
[1]Univeristy of Illinois at Urbana-Champaign, Urbana, Illinois, USA.

5.2 Tornadoes and crop lodging
Mark Sterling*[1] and Chris Baker[1]
[1]School of Engineering, University of Birmingham, Birmingham, United Kingdom B15 2TT.

5.3 Using deep neural networks to automate tree-fall pattern direction
William Wang*[1], Gregory Kopp[1], David Sills[1], Daniel Rhee[2], Mark Daley[1], and Emilio Hong[1]
[1]Northern Tornadoes Project, Western University, London, Ontario, Canada; [2]University of Illinois at Urbana-Champaign, Urbana, Illinois, USA.

5.4 Estimates of the range of wind speeds that cause tree fall failure for specific trees within the forest stands in Brazil and Georgia
Chris J. Peterson*[1], Jeffery B. Cannon[2], and Christopher M. Godfrey[3]
[1]Dept. of Plant Biology, University of Georgia, Athens, GA 30602, USA; [2]Jones Ecological Research Center, Newton, GA 39870, USA; [3]Dept. of Atmospheric Sciences, University of North Carolina at Asheville, Asheville, NC 28804, USA.

5.5 Effect of wind directionality in tornado design load
Sudhan S. Banik*[1], Peter J. Vickery[1], and Lawrence A. Twisdale[1]
[1]Applied Research Associates, Inc. Raleigh, NC, USA

5.6 Development of tornado load methodology and incorporation into the ASCE 7-22 standard for minimum design loads on buildings
Marc Levitan*[1], Long Phan[1], and Lawrence Twisdale[2]
[1]National Institute of Standards and Technology, Gaithersburg, MD 20899, USA; [2]Applied Research Associates, Inc. Raleigh, N. C., USA.

12:15 – 13:45 Lunch

13:45 – 15:15 Technical Session #6: Community Impact & Planning; Measurement & Observation; ASCE Tornado Wind Speed Estimation

6.1 Garage door wind damage vulnerabilities for residential and Commercial Buildings
J. Arn Womble*[1], Tanya M. Brown-Giammanco[1], Murray J. Morrison[1], Rachel N. Kovar[2], and Franklin T. Lombardo[3]
[1]Insurance Institute for Business & Home Safety, Richburg, SC 29729, USA; [2]Walsh Group, Chicago, IL 60607, USA; [3]University of Illinois at Urbana-Champaign 61801, USA

6.2 A method for adding intensity information to NWS preliminary tornado damage paths
Christopher Karstens*[1], Bryan Smith[1], Rich Thompson[1], and Somer Erikson[2,1]
[1]NOAA/NWS/Storm Prediction Center, Norman, Oklahoma; [2]DHS/FEMA, Washington, D.C.

6.3 Leveraging recent post-tornado damage findings to evaluate Kansas tornado vulnerability
Elaina J. Sutley*[1], Remy Lequesne[1], Jae Kim[1], William Kirkham[1], and Jared Clements[1]
[1]University of Kansas, Lawrence, KS 66045, USA

6.4 Multi-Tier Analysis of the 3 March 2019 Beauregard, AL Tornado and Impacts on Structural Loading
David B. Roueche*[1], Brett M. Davis[1], William S. Gunter[2], and Chris J. Peterson[3]
[1]Auburn University, Auburn, AL, 36849; [2]Columbus State University, Columbus, GA; [3]University of Georgia, Athens, GA

6.5 Sticky issues with using vehicles as damage indicators and insights from new field data
Fred L. Haan*[1] and David B. Roueche[2]
[1]Calvin University, Grand Rapids, MI, 49546, USA; [2]Auburn University, Auburn, AL, 36849

6.6 Assessing the failure wind speeds of manufactured homes subjected to tornado winds
Brett M. Davis*[1] and David B. Roueche[1]
[1]Calvin University, Grand Rapids, MI, 49546, USA; [2]Auburn University, Auburn, AL, 36849

15:15 – 15:30 Coffee break

15:30 – 17:00 Technical Session #7: Numerical Modeling & Simulation

7.1 On the role of flow acceleration in defining tornado wind loads on a low rise building
Matthew S. Mason*[1]
[1]School of Civil Engineering, University of Queensland, Qld. 4072, Australia

7.2 High-resolution simulations of tornado-like vortices with fully-developed turbulence
Nathan A. Dahl*[1,2] and David S. Nolan[3]
[1]Cooperative Institute for Mesoscale Meteorological Studies, University of Oklahoma, Norman, OK 73072, USA; [2]NOAA/National Weather Service/Storm Prediction Center, Norman, OK 73072, USA; [3]Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL 33149, USA.

7.3 Influence of swirl ratio and radial Reynolds number on wind characteristics of multi-vortex tornadoes
Yi Zhao[1] and Guirong Yan*[1]
[1]Department of Civil, Architectural and Environmental Engineering, Missouri University of Science and Technology, Rolla, MO, USA.

7.4 Computation method in performance-based design for wind engineering: introduction and application
Ali Merhi*[1] and Chris Letchford[1]
[1]Department of Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY 12180, USA.

7.5 An investigation of terrain-related effects on the vertical wind profiles in simulated tornadoes
Zachary Wienhoff*[1], Franklin T. Lombardo[1], David J. Bodine[4], Anthony E. Reinhart[2,3], Martin Satrio[4,5]
[1]University of Illinois at Urbana-Champaign, Urbana, Illinois, USA; [2]National Severe Storms Laboratory, Norman, OK.; [3]Cooperative Institute for Mesoscale Meteorological Studies, Norman, OK; [4]Advanced Radar Research Center, Norman, OK; [5]School of Meteorology, Norman, OK

7.6 Future of THWARTS and Interdisciplinary Tornado Collaboration
Franklin T. Lombardo*[1]
[1]University of Illinois at Urbana-Champaign, Urbana, Illinois, USA.

17:00 – 17:15 Refreshments & Closing Remarks

Closing remarks by **Franklin T. Lombardo**