

2024 Newsletter of the U.S. National Committee on Theoretical & Applied Mechanics (USNC/TAM)

Chair's Welcome

The U.S. National Committee on Theoretical and Applied Mechanics (USNC/TAM) has a 75-year history that is focused on the promotion, coordination, and advancement of mechanics activities in the U.S.; it also represents the U.S. mechanics community in the International Union of Theoretical and Applied Mechanics. The USNC/TAM connects researchers through scientific conferences and meetings, promotes activities to mentor junior researchers, and provides outreach to students, educators, and the public. I am honored to serve as chair for 2024-2026.

To begin, we thank Horacio Espinosa (chair 2022-24) and Beverley McKeon (chair 2020-2022) for their outstanding efforts in leading the USNC/TAM. Through their leadership, the USNC/TAM piloted two new efforts that I have highlighted below, the **Outreach Fellows Program** and the **5-Minute Virtual Thesis Competition in Mechanics**. In addition to these new programs, below you will also find a short summary of our work to support and mentor junior researchers attending 2024 International Congress on Theoretical and Applied Mechanics (ICTAM 2024) and other efforts to support the exchange knowledge and ideas on research topics involving mechanics.

The **Outreach Fellows Program** was designed by the Outreach and Education subcommittee, which is chaired by Nicole Sharpe (Science Communicator). The program involves virtual outreach activities that focused on fluid and solid mechanics and appropriate for K-12 classrooms. The program was extremely well received and attracted 86 applicants. The inaugural class of 16 Fellows received specialized science communication training and participated virtually in K-12 classrooms around the country throughout the 2024 calendar year.

The **USNC/TAM Virtual Thesis Competition** was also organized through the Outreach and Education subcommittee and spearheaded by Adrian Onas (Webb Institute). The goal of the competition was to promote research and communication excellence among recent PhD graduates in a research area related to mechanics. The competition garnered 44 applicants from universities across the U.S. In the final round of the competition held on September 20, 2024, 10 recent graduates summarized their thesis work in under 5 minutes and impressed the judges and the competitors' friends, family members, and mentors.

The USNC/TAM sponsors the **Thomas J.R. Hughes and the USNC/TAM Travel Fellowship** program to provide partial support for graduate students, postdoctoral scholars, and early career researchers to attend associated mechanics conferences. This past year, 22 early careers were awarded these fellowships to present their research at the 2024 International Congress on Theoretical and Applied Mechanics in Daegu, Korea. These fellows also participated in an USNC/TAM virtual workshop on "Getting the Mentoring You Need" facilitated by Wendy Crone (University of Wisconsin) and a conference breakfast to ensure direct interactions between the fellows and leaders in the field. We appreciate partial support from the National Science Foundation.

The USNC/TAM is also recruiting organizers for the AmeriMech workshop series. In May 2024, Rui Huang, K. Ravi-Chandar, and Xuanhe Zhao organized an **AmeriMech Symposium on Fracture of Soft Materials** in Austin, TX. Sam Daly, Krishna Garikipati, and Ashley Spear are planning an **AmeriMech on Machine Learning for Solid Mechanics** at the UCSB campus in early 2026. Other projects in the pipeline include a **Webinar on AI for Mechanics**, to be organized by Miguel Bessa and Horacio Espinosa. More information on these events will be available in the coming months.

Every year, the committee welcomes new members. This year, we welcome new society representatives, **Irene Fonseca** (AMS) and **Rekha Rao** (ACM). I would also like to thank the contributions of outgoing members, Edriss Titi (AMS) **Yuri Bazilevs** (ACM). Yuri Bazilevs will continue as a Member at Large for the coming year.

In closing, non-members of the USNC/TAM can participate in activities: nominate an early career researcher as a USNC/TAM Young Observer, engage with the subcommittees on "Communications and New Directions" and "Outreach and Education," propose an AmeriMech workshop or a Webinar, develop a topic for a Recent Trends in Mechanics Report or propose an IUTAM symposium or contribute to the 2026 U.S. National Congress on Theoretical and Applied Mechanics, which will be held in Pasadena, CA.

I wish you a prosperous and exciting 2025!

Melany Hunt (USNC/TAM Chair, 2024-2026)

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Report from the Annual Meeting of the USNC/TAM



Albert Einstein Memorial Statue © 1978 by Robert Berks.

The 2024 annual meeting of the USNC/TAM was held on May 3-4, 2024, at the National Academies Building in Washington, DC. On May 3, the beginning began with a fascinating presentation by Dr. Ralph Coppola, President and CEO of the Aerospace Education Program Alliance. He is also the founder and executive director of the Real-World Design Challenge, an annual competition for high school students providing an opportunity for student teams to work engineering challenges inspired by actual problems faced by practicing engineers. Following lunch, the committee heard an update from Ourania Kosti, Director of the Board International Scientific Organizations (BISO) from the National Academies on BISO operations.

The 2024 Distinguished Lecture was delivered by Robert J. Lang, a renowned origami artist and physicist (see description of Dr. Lang's work below). The Distinguished Lecture is open to the public. This year approximately 150 local high school students and their teachers were in the audience; several hundred views watched the lecture online. After the talk, the students and teachers were able to interact with Dr. Lang and the USNC/TAM committee. A recording of the lecture, including the many questions asked by students, is available on the National Academies website.

Following the Distinguished Lecture, the committee heard three fascinating presentations from Professor **David Hu** from Georgia Tech on *Mechanics of Ants, Earwax, and Wombats*, **Paul Veers** from the National Renewable Energy Laboratory on *Wind Energy: Status, Projections, and Grand Challenges*, and **Michael D. Graham** from the University of Wisconsin-Madison on *Data-Driven and Physics-Aware Microstructural Modeling of Flowing Complex Fluids*. These presentations show the tremendous variety of research topics covered by USNC/TAM. These presentations are also available on the [National Academies website](#).

On May 4th, the business meeting started with a report from the chair on the role of USNC/TAM, the committee participation in IUTAM, and professional development activities (Young Observer Program, Webinars, AmeriMech, Fellowships, Mentoring program, and Distinguished Lecture Series). **Tom Pence** delivered the Secretary report, **Ana Ferreras** presented the committee financial report, and **Robert McMeeking** discussed the IUTAM report. **Nicole Sharpe** presented an update on the Outreach Fellows Program and **Adrian Onas** described the process for the 5MT thesis competition. Finally, subcommittee chairs (**Sonya Smith**, **Yuri Bazilevs**, **Olivia Graeve**, and **Tom Pence**) reported on their subcommittees' activities. Most importantly, **Samantha Daly** (UCSB) was elected vice chair. New society representatives were also elected for ACM (**Rekha Rao** from Sandia) and for AMS (**Irene Fonseca**).

The US participation in IUTAM continues to be very vibrant, with Robert McMeeking (secretary general) serving in the Board of Directors from 2024-2028. Members at large include: Nadine Aubry and Krishnaswamy Ravi-Chandrar. Ellen Arruda, Cate Brinson, Gareth McKinley, and Charles Meneveau are serving in IUTAM Congress Committee (CC) until 2028, Furthermore, Ellen Arruda is serving in the Symposia Panel (Solids), and Horacio Espinosa and Ellen Longmire are serving in the Rural America Advocacy Group. The USNC/TAM also has 5 delegates in the General Assembly, through which it continuously provides input on member nominations for the CC, Congress opening/closing lectures, sectional lecturers, and chairs for thematic sessions (through the Nominations subcommittee).

USNC/TAM Young Observer Program



*The 2024 Young Observers is Prof. **Laura Villafane Roca** of the University of Illinois Urbana-Champaign. Prof. Villafane Roca's research interests include particle-laden flows, turbulence and heat transfer, compressible flows, and measurement technical, especially emphasizing non-intrusive optical diagnostics such as magnetic resonance imaging for fluid mechanics. Prof. Villafane Roca was able to join the 2024 Annual Meeting of the USNC/TAM.*

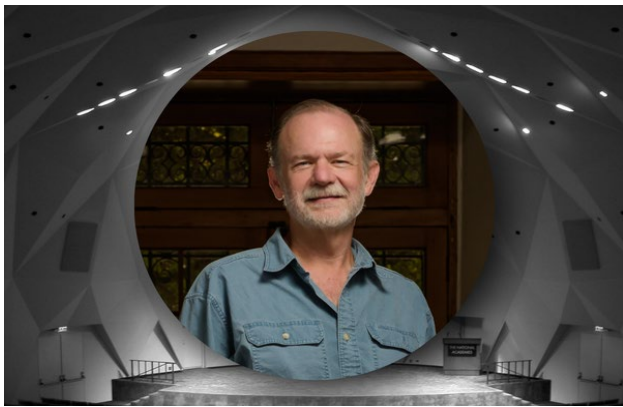
Prior Young Observers include Rosanna Zia (2023) from the University of Missouri, Hussein Aluie (2022) from the University of Rochester, Yash Kulkarni (2022) from the University of Houston, Arezoo Ardekani (2021) from Purdue University and Sinan Keten (2020) from Northwestern University.

The [USNC/TAM Young Observer Program](#) was launched in 2019-2020. The observers gain experience of national and international scientific coordination and diplomacy through exposure to the functions and responsibilities of the National Committee, as well as learning about opportunities for further engagement with USNC/TAM. A young professional is someone within 10-15 years of receiving their PhD and/or first professional appointment in an engineering or related field. The observer is invited to attend the annual committee meeting and events associated with the committee meeting. The observer travel expenses are covered by the Committee.

The USNC/TAM invites member professional societies to nominate an early career professional. The next round of the Young Observers program will happen in 2026. Nominations will be solicited from society representatives with one nomination per society. A nomination package consists of the nominee's CV including the link to their webpage and a paragraph of nomination, explaining how the nominee has demonstrated leadership potential in mechanics and why the nominee would benefit from a term as a USNC/TAM Young Observer. The Committee anticipates selecting one Observer each year.

2024 USNC/TAM Distinguished Lecture

The 2024 Distinguished Lecture was delivered on Friday, May 3, 2024, by **Robert J. Lang**, a celebrated origami artist, theorist, author, consultant and physicist. His presentation was entitled *From Tsuru to Satellites: The Art and Science of Origami*. Dr. Lang has used origami in his prior work at NASA's Jet Propulsion Laboratory, Spectra Laboratories, and JDS Uniphase. He has received more than 50 patents, written 21 books, and designed a CD-ROM on origami, which allows the reader to follow Lang's designs to create origami insects, birds, fish, and a wide variety of beautiful objects. Dr. Lang received the Caltech's Distinguished Alumni Award in 2009 and was elected a Fellow of the American Mathematical Society in 2013.



In November 2019, the USNC/TAM proudly announced the launch of a new series of Distinguished Public Lectures on Theoretical and Applied Mechanics. The objective of this series is to convey the

*excitement, to stimulate interest, and to discuss opportunities in the mechanical sciences and engineering related to advances in infrastructure, automation, transportation, energy, biomedicine, sustainability, exploration, and other areas. The targeted audience includes students and teachers interested in STEM fields at high schools across the nation and the public. The lectures are free and open to the public. They are streamed live and archived for future use. The lectures are supported by a substantial donation from **Susan and David Hibbitt**. We are extremely thankful for their generosity.*

Inaugural USNC/TAM 5-Minute Virtual Thesis Competition

The final round of the 5-Minute Virtual Thesis Competition and Awards Ceremony took place on September 20, 2024. The First Prize (\$2,000) was a tie between Dr. Alex Grigas (Yale University) and Dr. Ganesh Patil (University of Illinois Urbana-Champaign). The Third Prize (\$1,000) was awarded to Dr. Mohammadhossein Firouznia (UC-San Diego). Dr. Firouznia also won the People's Choice Award (\$500) based on voting among the audience members. Congratulations to all the participants in completing their doctorate degrees and to the competition winners for clearly and concisely describing their thesis research. In the coming months, look for more information on the upcoming 2025 competition.



USNC/TAM Webinars & Recent Trends in Mechanics Reports

In the past years, the USNC/TAM delivered online events showcasing varying topics in mechanics, such as “[Machine Learning in Mechanics](#)” and “[Art and Animation in Mechanics: Communicating Science and Engineering in the 21st Century](#).” If you are interested in organizing a Webinar, please contact Melany Hunt (hunt@caltech.edu).

Since 1991, the USNC/TAM has produced topical reports on subjects ranging from general computational mechanics, fluid mechanics, mechanics and medicine, additive manufacturing as well as other topical areas. More information on previous reports is available at the [Reports website](#).

You can reach the members of the USNC/TAM Executive Committee via email at executivecommittee@usnctam.org. We welcome your comments and suggestions and look forward to working with you to promote the activities of the U.S. mechanics community.

Upcoming USNCTAM 2026 and 2030



The US National Congress of Theoretical and Applied Mechanics (USNCTAM) is held every four years in a US university/college under the auspices of the U.S. National Committee on Theoretical and Applied Mechanics (USNC/TAM). This national committee fosters and promotes the exchange of ideas and information among the various disciplines of the TAM community around the world, and to chart future priorities in mechanics related research, applications, and education. The 20th USNCTAM will be held June 21-24, 2026 in Pasadena, California and is hosted by the University of Southern California (USC), Caltech, and University of California Los Angeles. Roger Ghanem (USC) will serve as

congress chair.

The USNC/TAM is also soliciting proposals for the 2030 National Congress. The Congress hosts have considerable latitude to design the structure and content of the Congress. Innovative activities and arrangements have occurred at past Congresses, including collaboration with partner international mechanics committees. Interested parties are encouraged to work with the USNC/TAM in proposal development. Please contact Tom Pence (pence@egr.msu.edu) or Melany Hunt (hunt@caltech.edu).

Successful ICTAM 2024, IUTAM General Assembly Meeting and Other IUTAM News



International Union of
Theoretical and Applied Mechanics

The 26th International Congress on Theoretical and Applied Mechanics, ICTAM 2024, was held on August 25-30 in Daegu, South Korea. The Congress commemorated the 100th Anniversary of ICTAM. The United States was well represented at the Congress. Furthermore, the Batchelor Prize was awarded to **Charles Meneveau** (Johns Hopkins University) and the Hill Prize to **Yonggang Huang** (Northwestern University). In addition there were two section lectures by Ellen Arruda (Univ. of Michigan) and Gareth McKinley (MIT). The technical program included 8 mini-symposium with 5 of the symposiums co-organized by individuals from US universities. The USNC/TAM hosted the **Thomas J.R. Hughes and the USNC/TAM Travel Fellowship** recipients (22) at a mentoring breakfast prior to the start of the Congress. The next ICTAM will be held in Vienna, Austria, August 21-25, 2028.

In 2023, the IUTAM General Assembly unanimously adopted the following Resolution on the **registration of IUTAM as a new legal entity**: “*The General Assembly of the International Union of Theoretical and Applied Mechanics (IUTAM) agrees to the establishment of an incorporated association for IUTAM in Amsterdam, the Netherlands, in accordance with Dutch Civil Law. The new association will be a continuation of IUTAM under the same name. The General Assembly accepts the text of the Deed of Incorporation of the association that is attached to the Resolution. Internal regulations of the new association will be debated until they are acceptable to the General Assembly of the current IUTAM before they will be adopted by the general meeting of the first three members of the new association.*”

Other IUTAM news concerned IUTAM symposia and Summer Schools. Details concerning the forthcoming Symposia in can be found in the [IUTAM website](#).

Upcoming Dates, Deadlines and Calls

- March 20, 2025** Application deadline for submitting proposals from institutions wishing to host the 2030 US National Congress on Theoretical and Applied Mechanics. Please contact Tom Pence (pence@egr.msu.edu) or Melany Hunt (hunt@caltech.edu).
- June 21-24, 2026** The 2026 US National Congress on Theoretical and Applied Mechanics will be held in Pasadena, CA.

USNC/TAM Member Societies and Officers

Executive Committee (2024-2025)

Chair	Melany Hunt (Caltech)	Vice Chair	Samantha Daly (UCSB)
Secretary	Tom Pence (MSU)	Past Chair	Horacio Espinosa (Northwestern)
Soc. Coord.	Sonya Smith (Howard)		

Member societies and current representatives

AAM American Academy of Mechanics
AIAA American Institute of Aeronautics & Astronautics
AIChE American Institute of Chemical Engineers
AMS American Mathematical Society
APS American Physical Society
ASA Acoustical Society of America
ASCE American Society of Civil Engineers
ASME American Society of Mechanical Engineers
ASTM International
SEM Society for Experimental Mechanics
SES Society of Engineering Science
SIAM Society for Industrial & Applied Mathematics
SOR Society of Rheology
USACM US Assoc. for Computational Mechanics
SNAME Soc. Naval Architecture and Marine Eng.

Members-at-large

[Open]
M. Majji (Texas A&M University)
Sibani Biswall (Rice University)
Irene Fonseca (Carnegie Mellon University)
Satish Kumar (University of Minnesota)
Christina Naify (NRL)
Glaucio Paulino (Princeton)
Taher Saif (UIUC)
Richard Neu (Georgia Tech)
Yong Zhu (NCSU)
Sinan Keten (Northwestern University)
Gerard Awanou (UIC)
Anne Grillet (Sandia)
Rekha Rao (Sandia)
Adrian Onas (Webb Institute)

Olivia Graeve (UCSD)
Thomas Searles (UIC)
Nicole Sharp (FYFD)
Yuri Bazilevs (Brown University)

Ex officio members

Ellen Arruda (University of Michigan)
L. Cate Brinson (Duke University)
Theresa Kotanchek (Evolved Analytics LLC)
Gareth McKinley (MIT)
Kathleen Stebe (University of Pennsylvania)

Nadine Aubry (Tufts University)
Ellen Longmire (University of Minnesota)
Robert McMeeking (UCSB)
Roger Ghanem (USC)

National Academies Staff

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Staff Support: Diamond de Guzman

BISO Director: Ourania (Rania) Kosti

About USNC/TAM

The U.S. National Committee on Theoretical and Applied Mechanics (USNC/TAM) represents the United States in national and international activities related to the broad science of mechanics, including related sciences, engineering, and mathematics. It serves as a focal point for charting future priorities in mechanics related research, applications, and education. It represents the United States in the [International Union of Theoretical and Applied Mechanics \(IUTAM\)](#). For more information regarding USNC/TAM, please refer to the [committee website](#). The USNC/TAM was formed in 1948 and came under the umbrella of the National Academies in 1966. Please send newsletter ideas and suggestions to executivecommittee@usnctam.org.