

## 2023 Newsletter of the U.S. National Committee on Theoretical & Applied Mechanics (USNC/TAM)

### Chair's Welcome

In 2023, our committee witnessed exciting developments. USNC/TAM launched a new [website](#) and the “**Outreach Fellows**” program. The new website was designed by the **Communications and New Directions subcommittee**. I invite you to browse it. The Outreach Fellows program, a Pilot Program involving nationwide virtual outreach activities on mechanics with K-12 classrooms, was designed by the **Outreach and Education subcommittee**. The program was extremely well received and attracted 86 applicants. The inaugural class of 16 Fellows will receive specialized science communication training and participate virtually in K-12 classrooms around the country throughout the 2024 calendar year.

USNC/TAM was also very active in recruiting organizers for the AmeriMech workshop series. Rui Huang, K. Ravi-Chandar, and Xuanhe Zhao are organizing an **AmeriMech on Fracture of Soft Materials**. The event will take place at the University of Texas, Austin campus on May 12-16, 2024. Sam Daly, Krishna Garikipati, and Ashley Spear are planning an **AmeriMech on Machine Learning for Solid Mechanics** at the UCSB campus in February 2025. Other projects in the pipeline include a **Webinar on AI for Mechanics**, to be organized by Miguel Bessa and myself, and the launch of a **National Five-Minute PhD Thesis Competition**, with monetary prizes, to be organized by Adrian Onas and Maria Emelianenko. More information on these events will be available early next year.

In the past years, the USNC/TAM has been increasing member participation, advancing diversity, equity, and inclusion, and organizing several activities designed to fulfill its mission: to promote, coordinate and advance all aspects of research in the broad field of mechanics throughout the United States, and to represent the United States in the IUTAM and participate in its activities. This new impetus would have not been possible without the contributions of **Beverley McKeon** (past chair), **Tom Pence** (secretary), **Melany Hunt** (vice-chair), **Sonya Smith** (intersociety coordinator), and **Ana Ferreras** (BISO representative). A special thank is due to the **Communications and New Directions subcommittee**: Yuri Bazilevs (chair), Cate Brinson, Arezoo Ardekani, Sam Daly, Horacio Espinosa, Beverley McKeon, Sinan Ketten; the **Outreach and Education subcommittee**: Nicole Sharp (chair), Maria Emelianenko, Edriss Titi, Patrick Underhill; the **Diversity and Action subcommittee**: Vicky Nguyen (chair), Horacio Espinosa, Anne Grillet, Sonya Smith; the **Intersociety Coordination subcommittee**: Sonya Smith (chair), Melany Hunt, Rich Neu, Paul Palies, Tom Pence; the **Nominations subcommittee**: Beverley McKeon (chair, ex officio), Horacio Espinosa, Melany Hunt, Tom Pence; and the **Congress Site Selection subcommittee**: Tom Pence (chair), Rich Neu, Yuri Bazilevs, Roger Ghanem, Chad Landis. This committee structure has facilitated a more vibrant engagement of committee members, better coordination with all 15 participating societies, the establishment of new outreach activities, the creation of new and better communication tools, the promotion of events to identify and publicize new directions in mechanics, and the advancement of diversity, equity, and inclusion.

Every year, the committee welcomes new members. I would like to welcome two new members at large (MAL), **Olivia Graeve** (UCSD) and **Thomas Searles** (University of Illinois at Chicago), and new society representatives, **Manoranjan Majji** (AIAA), **Sibani Biswal** (AIChE), **Satish Kumar** (APS), **Sinan Ketten** (SES), and **Gerard Awanou** (SIAM), all prominent members of our community who have gracefully committed to championing and advancing the USNC/TAM mission. I would also like to thank the contributions of outgoing members, **Maria Emelianenko** (SIAM), **Vicky Nguyen** (SES), **Paul Palies** (AIAA), and **Patrick Underhill** (AIChE).

There are several ways that non-members of the USNC/TAM can participate in USNC/TAM activities at the Chair's discretion: 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. Members of our community are also encouraged to participate in the 26th International Congress on Theoretical and Applied Mechanics, [ICTAM 2024](#), which will be held in Daegu (South Korea) on August 25-30, 2024. This IUTAM Congress will commemorate the **100 Anniversary of ICTAM, IUTAM's Congress!** We highly encourage you to submit an abstract before January 15, 2024, especially if you are a junior researcher (less than 8 years from terminal degree). If your abstract gets selected, you will be eligible to apply for a USNC/TAM fellowship to offset the travel cost.

We welcome your comments and suggestions and look forward to working with you to promote the activities of the U.S. mechanics community. You can reach the members of the USNC/TAM Executive Committee via email at [executivecommittee@usnctam.org](mailto:executivecommittee@usnctam.org). I wish you a prosperous and exciting 2024!

**Horacio D. Espinosa (USNC/TAM Chair, 2022-2024)**

## In this issue

[Report from the Annual Meeting of the USNC/TAM](#)  
[USNC/TAM Webinars in Mechanics](#)  
[USNC/TAM Travel Fellowships Program](#)  
[Successful USNC/TAM Conference](#)  
[Upcoming Dates, Deadlines and Calls](#)  
[About USNC/TAM](#)

[2023 USNC/TAM Distinguished Lecture](#)  
[USNC/TAM Young Observer Program](#)  
[Recent Trends in Mechanics Reports](#)  
[Report from IUTAM General Assembly](#)  
[USNC/TAM Member Societies and Officers](#)

## Report from the Annual Meeting of the USNC/TAM

The 2023 annual meeting of the USNC/TAM was held on May 5-6, 2023, at the National Academies Building in Washington, DC. On May 5<sup>th</sup> the committee hosted NAS President, **Marcia McNutt**, who shared information on academy activities, domestic and international. Presentations by several program officers in charge of mechanics and large-scale programs were delivered by **Bruce Kramer** (NSF), **Dragana Brzakovic** (NSF), and **Bennett Ibey** (AFOSR). Professor **Gang Bao** from Rice University presented a talk entitled “*Nanomedicine and Genome Editing Approaches for Disease Therapies*.” The first meeting date concluded with the delivery of the USNC/TAM Distinguished Lecture (see below for details). On May 6<sup>th</sup>, the business meeting started with a report from the chair on the role of USNC/TAM, the U.S. participation in IUTAM, and professional development activities planned and held by the committee (Young Observer Program, Webinars in Mechanics, AmeriMech, Travel 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. Finally, the five subcommittee chairs reported on the subcommittees’ activities and accomplishments. Two new members at large (MAL), Olivia Graeve (UCSD) and Thomas Searles (University of Illinois at Chicago) were elected.

The U.S. participation in IUTAM continues to be very vibrant with Nadine Aubry (vice president) and Robert McMeeking (secretary) serving in the Board of Directors, and Ellen Arruda, Cate Brinson, Gareth McKinley, Kathleen Stebe serving in the Congress Committee (CC) until December 31, 2024; furthermore, Ellen Longmire is serving in the Symposia Panel (Fluids), and Horacio Espinosa and Ellen Longmire are serving in the Diversity Advocacy Group (DAG). In addition, the United States has 5 delegates in the General Assembly that continuously provides input on diversity and nominates members for the CC, ICTAM opening/closing lectures, sectional lecturers, and chairs for thematic sessions (through the Nominations subcommittee).

As in previous meetings, the committee had a sustained and thoughtful discussion on how to expand access to mechanics, how to strengthen the commitment of the USNC/TAM to diversity, equity, and inclusion, and how to develop effective tools for outreach to the broad community interested in mechanics, leading to some of the initiatives you see described in this newsletter.

## 2023 USNC/TAM Distinguished Lecture

We were delighted to host **John Rogers**, Simpson/Querrey Professor of Northwestern University to deliver the annual USNC/TAM Distinguished Lecture on Friday, May 5<sup>th</sup>, 2023. Professor Rogers’ research has been recognized by many



awards, including a MacArthur Fellowship (2009), the Lemelson-MIT Prize (2011), the Smithsonian Award for American Ingenuity in the Physical Sciences (2013), and the Benjamin Franklin Medal (2019). His fascinating lecture entitled “Creating Soft Biocompatible Tech” engaged members of the public, K-12 students, undergraduates, graduate students, academics, and industry professionals alike, showcasing advances in mechanical and electrical engineering, materials science, and manufacturing. His talk featured some recently created “biocompatible” devices, including a battery-free electronic “tattoo” that monitors vital signs for neonatal intensive care patients and a microfluidic sensor that helps elite athletes manage their hydration.

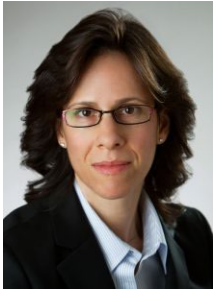
*In November 2019, the USNC/TAM proudly announced the launch of a new series of Distinguished Public Lectures on Theoretical and Applied Mechanics. The objective of this series is to convey the excitement, to stimulate interest, and to discuss opportunities in the mechanical sciences and engineering related to advances in infrastructure, automation, transportation, energy, biomedicine, sustainability, exploration, and other STEM 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 livestreamed and available in the USNC/TAM website. The lectures are supported by a substantial donation from **Susan and David Hibbitt**. We are extremely thankful for their generosity and support.*

## USNC/TAM Webinars

For the past three years, the USNC/TAM delivered online events showcasing a great variety of topics in mechanics “[Machine Learning in Mechanics](#)” and “[Art and Animation in Mechanics: Communicating Science and Engineering in the 21<sup>st</sup> Century](#).” All these webinar have been recorded and are available in the USNC/TAM. If you are interested in organizing a Webinar, please contact the USNC/TAM Executive Committee via email at [executivecommittee@usnctam.org](mailto:executivecommittee@usnctam.org).



## USNC/TAM Young Observer Program



The USNC/TAM selected a Young Observer in 2023. Prof. **Roseanna Zia** of the University of Missouri who is an expert in micro-continuum theory for structure-property relationships of flowing suspensions and their multi-scale computational modeling. She is also the Wollersheim Professor of Mechanical and Aerospace Engineering and Associate Dean for Research in the College of Engineering at the University of Missouri. The USNC/TAM also selected Prof. **Andrej Kosmrljas**, from Princeton University, as the 2023 Friend of the Committee. The previous Young Observers and Friends of the Committee have been active in USNC/TAM, with 2020 Young Observer Sinan Keten participating in the Ad-Hoc Committee



on the Structure of the USNC/TAM and recently joining the Committee as SES representative. The 2021 Young Observer, Arezoo Ardekani, presented her work at the USNC/TAM's von Karman mini-symposium that took place at the USNCTAM in Austin. Previous Friends of the Committee, such as Profs. Sam Daly (Member at Large) and Yong Zhu (SEM representative), were also elected to join the USNC/TAM. These initiatives have helped the committee to engage early career experts and reduce the average age of its membership.

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

*The USNC/TAM invites member professional societies to nominate an early career professional to be one of the 2024-25 Young Observers. Society Representatives should send their nominations to Tom Pence, Secretary of the USNC/TAM, at [pence@egr.msu.edu](mailto:pence@egr.msu.edu) by January 31, 2024 (one nomination per society). The 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 either in Fluid Mechanics or Solid Mechanics each year. Nominees and nominators will be notified of the Committee's decision by February 28, 2024.*

## USNC/TAM Travel Fellowships and Mentoring Program

In 2024, the USNC/TAM will provide a variety of fellowships to students and early career scientists to attend the ICTAM 2024 in South Korea. Through an NSF award, the USNC/TAM plans to support U.S. early career scientists' attendance to ICTAM. The USNC/TAM will also provide five **Thomas Hughes Fellowships**, using private funds, to participate in the congress. These fellowships are designed to encourage the participation of early career researchers from diverse backgrounds and institutions and those who might not be familiarized with IUTAM and/or the USNC/TAM. *Instructions for submission of applications are forthcoming.*

All selected fellows and other young researchers will be invited to an online **Mentoring Event prior to the Congress**, which will be led by **Profs. Melany Hunt** (Caltech) and **Olivia Graeve** (UCSD). This event is part of a series designed to develop communications skills in early career researchers in the field of mechanics. Participants will learn about the role of IUTAM and USNC/TAM and participate in a mentoring session at the ICTAM 2024. We look forward to engaging the next generation of U.S. mechanicians in the activities of the USNC/TAM!

## Recent Trends in Mechanics Reports

This series has resulted in several reports since 1991 on topics 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](#).

The USNC/TAM is pleased to invite proposals for the **Reports on Recent Trends in Mechanics** series. Researchers and research teams interested in the creation of a new report in a relevant topical area may submit a 250-word proposal to the chair of the Communications and New Directions subcommittee ([Yuri Bazilevs](#)) via email by **March 15, 2024**. Proposals will be reviewed by the subcommittee and confirmed by the full USNC/TAM by May 2024. Full reports will be due six months later (December 31, 2024) and the full reports will be reviewed by the USNC/TAM prior to publication. Please contact the USNC/TAM Executive Committee via email at [executivecommittee@usnctam.org](mailto:executivecommittee@usnctam.org) for additional information.

## Highly Successful 2022 U.S. National Congress of TAM



The U.S. National Congress of Theoretical and Applied Mechanics is held every four years under the auspices of the U.S. National Committee on Theoretical and Applied Mechanics (USNC/TAM). The purpose of this initiative is to foster and promote 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 19th USNCTAM was successfully hosted by the University of Texas at Austin, at the AT&T Executive

Education and Conference Center from June 19-24, 2022. A special thanks to all organizers and the conference chair, Chad Landis, for delivering one of the best attended USNCTAM congresses (759 delegates, 300 students, 788 presentations from 952 abstracts, 186 tech sessions in 63 mini-symposia, 55 posters, NSF office hours, and 100 participants at a Women's Networking event). Four fascinating **plenary lectures** were delivered covering climate change (**Jackie Chen**, *Sandia National Laboratories*), ocean exploration (**John Dabiri**, *California Institute of Technology*), data driven modeling in biomedical sciences (**Ellen Kuhl**, *Stanford University*), and additive and freeform manufacturing (**Nancy Sottos**, *University of Illinois at Urbana-Champaign*). A listing of the 31 mini-symposia in fluids and 32 mini-symposia in solids can be found at <https://www.usnctam2022.org/program>. Presentations were delivered in all areas of fluid and solid mechanics, including experimental mechanics, computational mechanics, dynamical systems, materials, data science, structural mechanics, and biomechanics. During the conference, the USNC/TAM led a special mini-symposium on the legacy of Theodore von Karman in mechanics (solids and fluids) on the 100<sup>th</sup> anniversary of the Innsbruck meeting that led to IUTAM, spanning his impact on research, education and international collaborations.

The next U.S. National Congress of Theoretical and Applied Mechanics will be held in **Pasadena, California in 2026**. Roger Ghanem (USC) will serve as congress chair.

## Report from the IUTAM General Assembly Meetings and Other IUTAM News



International Union of  
Theoretical and Applied Mechanics

The 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 by 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.”

Another item concerned the **creation of a Diversity Advocacy Group (DAG)**, which was approved by the General Assembly. DAG members are Leslie Banks-Sills, Horacio D. Espinosa, Ellen Longmire, Maria Salvetti, and Helen Wilson. The DAG submitted four proposals to the IUTAM Board of Directors: 1) Creation of a new category of symposia to solicit IUTAM proposals for the diversity and promise of the field of mechanics (two symposia funded at \$10K in the next period) with potential topics in Quantum mechanics sensing; Mechanics applied to climate change; Mechanics in personalized medicine; Failure of novel energy materials; Mechanics in resilience to extreme events; 2) Extra support for regular symposia to run extension events in the area of diversity-target participants (\$30K for two such events in the next period); 3) All symposia required to consider diversity in their applications. The statement approved by IUTAM states: “*IUTAM values Diversity as a supporting principle for pursuing the objectives of IUTAM and maintaining the highest standards in all its activities. IUTAM understands Diversity as the range of human differences, including but not limited to race, gender, age, subject of expertise and geographic representation,*” should be distributed to people who express an interest in proposing an IUTAM symposium; 4) New symposia topics to be gathered by means of a community survey.

Other IUTAM news concerned IUTAM symposia and Summer Schools. Details concerning the forthcoming Symposia in 2024 can be found in the [IUTAM website](#).

## Upcoming Dates, Deadlines and Calls

<b>January 31, 2024</b>	Deadline for Young Observer nominations through participating societies.
<b>April 30, 2024</b>	Application deadline for travel USNC/TAM fellowships to ICTAM 2024.
<b>March 31, 2024</b>	Individuals interested in proposing IUTAM symposia for the 2025/2026 period should contact Prof. Tom Pence, <a href="#">Secretary of the USNC/TAM</a> , for assistance in developing such proposals.
<b>August 25-30, 2024</b>	The 26th International Congress on Theoretical and Applied Mechanics, ICTAM 2024, will be held in Daegu (South Korea)! <a href="#">Check out the promotional video on Youtube</a> .

## USNC/TAM Member Societies and Officers

### *Executive Committee (2022-2024)*

Chair	Horacio D. Espinosa (Northwestern)	Vice Chair	Melany Hunt (Caltech)
Secretary	Tom Pence (MSU)	Past Chair	Beverley McKeon (Stanford)
Soc. Coord.	Sonya Smith (Howard)		

### *Member societies and current representatives*

AAM American Academy of Mechanics	[Open]
AIAA American Institute of Aeronautics & Astronautics	M. Majji (Texas A&M University)
AICHE American Institute of Chemical Engineers	Sibani Biswall (Rice University)
AMS American Mathematical Society	Edriss Titi (Texas A&M)
APS American Physical Society	Satish Kumar (University of Minnesota)
ASA Acoustical Society of America	Christina Naify (NRL)
ASCE American Society of Civil Engineers	Glaucio Paulino (Princeton)
ASME American Society of Mechanical Engineers	Taher Saif (UIUC)
ASTM International	Richard Neu (Georgia Tech)
SEM Society for Experimental Mechanics	Yong Zhu (NCSSU)
SES Society of Engineering Science	Sinan Keten (Northwestern University)
SIAM Society for Industrial & Applied Mathematics	Gerard Awanou (UIC)
SOR Society of Rheology	Anne Grillet (Sandia)
USACM U.S. Assoc. for Computational Mechanics	Yuri Bazilevs (Brown University)
SNAME Soc. Naval Architecture and Marine Eng.	Adrian Onas (Webb Institute)

### *Members-at-Large*

S. Daly (UCSB)  
Olivia Graeve (UCSD)  
Thomas Searles (UIC)  
Nicole Sharp (FYFD)

### *Ex officio members*

Ellen Arruda (University of Michigan)	Nadine Aubry (Tufts University)
L. Cate Brinson (Duke University)	Ellen Longmire (University of Minnesota)
Theresa Kotanchek (Evolved Analytics LLC)	Robert McMeeking (UCSB)
Gareth McKinley (MIT)	Roger Ghanem (UCLA)
Kathleen Stebe (University of Pennsylvania)	

### *National Academies Staff*

Senior Program Officer: Ana Ferreras	
Staff Support: Pamela Gamble	BISO Director: Ourania Kostis

## 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](mailto:executivecommittee@usnctam.org).