ACOUSTICAL SOCIETY OF AMERICA

Silver Medal in

Acoustical Oceanography

Stan E. Dosso

2023

The Silver Medal is presented to individuals, without age limitation, for contributions to the advancement of science, engineering, or human welfare through the application of acoustic principles, or through research accomplishment in acoustics.

PREVIOUS RECIPIENTS

Clarence S. Clay	1993
Herman Medwin	1997
D. Vance Holliday	2004
Robert C. Spindel	2009

ENCOMIUM FOR STAN E. DOSSO

. . . for contributions to Bayesian inference methods in ocean acoustics and marine geophysics.

15 MAY 2024 • OTTAWA, CANADA

Stan Dosso grew up in Victoria, British Columbia (BC), Canada, in a family with a brother and two sisters. His mother was a nurse, his father was a physics professor at the University of Victoria (UVic). The family lived a short walking distance from the university, where Stan decided to enroll for undergraduate studies in physics and mathematics. His first experience with ocean acoustics was while working toward his BSc, when he spent a summer work term supervised by Ross Chapman at what was then the Defence Research Establishment Pacific (DREP). Stan then went on to earn an MSc in physics at UVic, supervised by Ross, studying ocean-acoustic slope effects on the BC continental slope. Stan's time at UVic coincided with the appearance of a happy face painted on the dome of UVic's astronomy observatory. While this is considered an iconic sight on the campus today, at that time the painting was an unauthorized student-led initiative, a hallmark of the 1982 Physics class to which Stan belonged. More than 40 years later, despite my best forensic efforts, the details behind this story are still a bit fuzzy, but I like to believe this marks the start of Stan's influence at UVic.

Stan then moved to the University of British Columbia in Vancouver for a PhD in geophysics, studying geoelectromagnetic induction with Douglas Oldenburg, and developing a career-long interest in geophysical inverse theory.

Stan was hired at DREP in Victoria directly out of grad school and he worked there for 5 years, doing annual multi-week field camps on the polar ice pack. Stan always has been an avid outdoorsman, and I know he loved his time at sea and on the ice, despite seasickness interrupting data collection for his MSc, some close calls with polar bears, ice-floe breakups, and unsuccessful experiences at trying to brew coffee for colleagues. His research with DREP involved sea-ice seismo-acoustics, array element localization, and early work in geoacoustic inversion. In 1995, Stan was hired as an Ocean Acoustics Research Chair and Assistant Professor in the School of Earth and Ocean Sciences at UVic. In those early professional days, Stan and his wife Shelley raised three sons. With three young children, Stan on tenure-track, and Shelley working nights and weekends as a nurse, this was a very busy period, but among Stan's favorite times.

This led to a very successful and prolific career at UVic, where Stan continued his research in ocean acoustics and geophysical inversion problems. The over-arching theme of Stan's research is to quantify the information content of observational data to study physical systems that cannot be observed directly. His contributions in ocean acoustics cover the estimation of environmental parameters, such as of the seabed, water column and sea ice, but also source parameters, such as location or spectra. Stan notably wrote two seminal papers published in the *Journal of the Acoustical Society of America* in 2002 in which he formulated a numerical Bayesian approach to geoacoustic inversion. More recently, his flagship contribution has been the trans-dimensional, or transD, inversion method that he and then post-doc Jan Dettmer (now professor at University of Calgary) developed and introduced to the ocean acoustics community. When applied to seafloor geoacoustic inversion, transD notably enables researchers to learn the seabed parameterization, for example the number of sediment layers, from the data rather than fixing it arbitrarily, which otherwise biases the results.

Geoacoustic inversion has probably been Stan's main research area: he has worked with diverse types of ocean acoustic data including matched field, reflection coefficients, ray travel times, modal dispersion, interface-wave dispersion, reverberation, scattering, ambient noise, ship noise, and vector-sensor data. Quantifying the relative information content of different acoustic observables to estimate various seabed model parameters has been incredibly significant, a clear improvement over the sometimes ad-hoc methods that were used previously. In the past few years, Stan has collaborated with many acousticians to provide a detailed understanding of fine-grained sediment properties and their acoustic response. The use of transD methods was instrumental in gaining an improved understanding the seafloor of the New England Mud Patch, an area of high interest for our community. Stan's methods especially resulted in a clearer comprehension of the gradual

transition between the mud and sand sub-bottom layers, a geological feature that was poorly understood before that.

Given the computationally intensive numerical methods employed, algorithmic research has also been a significant part of Stan's work. In his early work, Stan proposed efficient global optimizations methods, and later turned his attention to Bayesian sampling and error modeling. His current transD Bayesian algorithm provides a powerful approach to large-scale problems with many tens of unknown parameters. It is fair to say that Stan's contribution is bigger than just acoustics, and has impacted wave physics in general. His original work in acoustic inversion, including parallel tempering, covariance modeling, and transD birth-from-the-prior, have become well-accepted methods in the larger field of geophysical inversion. In short, I do believe Stan is an inverse problem genius who understands wave propagation, computational methods, and advances acoustical oceanography by using his theoretical skills to solve real world problems.

Impressively enough, Stan is much more than just an inversion nerd, he is also an outstanding educator and mentor. Stan served as the Director of the School of Earth and Ocean Sciences, a major department of UVic, from 2016 to 2021. Over the course of his career at UVic, Stan has been teaching both at the undergraduate and graduate levels and supervised many graduate students and postdocs, several of whom continued with very successful careers and won awards from the Acoustical Society of America (ASA).

Stan is also very active in the ASA. His most notable contributions have been to chair the 176th ASA meeting in Victoria, to co-organize four ASA Schools, and to be elected to leadership positions including Vice President (2019-22) and President (2022-24).

In recognition of the significance and impact of Stan's research, he was recognized as an ASA Fellow in 2001, and was awarded the Medwin Prize in Acoustical Oceanography in 2004. Two years later Stan's teaching and research mentorship were recognized by UVic's Faculty of Science Teaching Excellence Award (2006).

For all these reasons, I cannot think of a more deserving recipient of the ASA Silver Medal in Acoustical Oceanography. Congratulation Stan, it is a well-deserved honor!

JULIEN BONNEL

WALLACE CLEMENT SABINE AWARD OF THE ACOUSTICAL SOCIETY OF AMERICA

Peter D'Antonio

2023

The Wallace Clement Sabine Award is presented to an individual of any nationality who has furthered the knowledge of architectural acoustics, as evidenced by contributions to professional journals and periodicals or by other accomplishments in the field of architectural acoustics.

PREVIOUS RECIPIENTS

Vern O. Knudsen	1957	Russell Johnson	1997
Floyd R. Watson	1959	Alfred C. C. Warnock	2002
Leo L. Beranek	1961	William J. Cavanaugh	2006
Erwin Meyer	1964	John S. Bradley	2008
Hale J. Sabine	1968	J. Christopher Jaffe	2011
Lothar W. Cremer	1974	Ning Xiang	2014
Cyril M. Harris	1979	David Griesinger	2017
Thomas D. Northwood	1982	Michael Vorländer	2018
Richard V. Waterhouse	1990	Gary W. Siebein	2020
A. Harold Marshall	1995		

SILVER MEDAL IN ARCHITECTURAL ACOUSTICS

The Silver Medal is presented to individuals, without age limitation, for contributions to the advancement of science, engineering, or human welfare through the application of acoustic principles, or through research accomplishment in acoustics.

PREVIOUS RECIPIENT

Theodore J. Schultz 1976

ENCOMIUM FOR PETER D'ANTONIO

. . .for contributions to theory, design, and application of acoustic diffusers.

15 MAY 2024 • OTTAWA, CANADA

Peter D'Antonio was born in Brooklyn, New York. His family introduced him to the music of the big bands and close vocal harmony groups, and he also played French horn in a competing parish drum and bugle corps. His love of music continued into the doo-wop era of the 1950's, when he formed an acapella group called the Dialtones, and in later years, he sang and played guitar in a cover band. He earned a B.S. in Physical Chemistry from St. John's University (1959-1963). His graduate studies were at the Polytechnic Institute of Brooklyn, where he graduated with a Ph.D. in Infrared Spectroscopy and a minor in X-ray crystallography. Following graduation, he began his professional career as a diffraction physicist at the Naval Research Laboratory in Washington, D.C. under the supervision of Nobel Laureate Dr. Jerome Karle. Peter studied the structure of matter in gaseous, amorphous, and crystalline phases, using electron, x-ray, and neutron diffraction, as well as electron and atomic force microscopy. He retired in 1996 following a distinguished career in fundamental structural research to focus on his passion for music composition, performance, recording, and a new career in architectural acoustics.

Peter began recording his compositions informally in his home in the early 1970s. As the music evolved and collaborators increased, there was a need for a soundproof recording studio, which he planned to locate in the basement of his residence. Never having designed a recording studio, his literature search revealed an article by Manfred Schroeder in the October 1980 issue of Physics Today, which described number-theoretic reflection phase grating (RPG) diffusors that were capable of uniformly scattering sound in concert halls. Inspired by these concepts and additional information on the acoustics of larger performance spaces he created a novel design for critical listening rooms. The design utilized a reflection-free zone, surrounding the listener to minimize interfering early reflections and simulate the initial time delay in larger spaces, and a diffuse field zone created with RPG diffusers on the rear wall to uniformly scatter incident sound and create an enveloping passive "surround" sound. Delving deeper into RPG theory, he surprisingly discovered that these diffusers were 2-dimensional periodic arrays similar to the 3-dimensional periodic crystal lattices he had been studying as a diffraction physicist. Peter was then able to design and model diffuser systems for recording studios using the Fraunhofer diffraction theory. The new design evolved into a commercial recording studio called Underground Sound.

Peter founded RPG Diffusor Systems in 1983 to evolve diffusive technology and manufacture commercial products. The first professional installation of the RPG diffusers was on the rear wall of the Oak Ridge Boys' Acorn Sound Recorders in Henderson, TN, in 1984. The new design became the standard in the recording industry.

Dr. D'Antonio was invited to join a team making acoustic measurements at Carnegie Hall for its 100th anniversary in 1989. These measurements resulted in the installation of RPG diffusers on the rear wall to remove a problematic slapback echo.

To verify the performance of diffusing surfaces, he designed and built the first experimental goniometer in 1993 to measure scattered polar responses at various angles of incidence. He and Trevor Cox developed a new diffusion coefficient from these polar responses, which was eventually standardized as ISO 17497-2 in 2012. Their collaboration also created three editions of the definitive text on sound absorbing and diffusing materials *Acoustic Absorbers and Diffusers: Theory, Design, and Application*. This notable effort is somewhat similar to the efforts made by Wallace Clement Sabine to quantify the acoustical properties of building materials as a major contribution to the field of architectural acoustics.

Dr. D'Antonio was invited to join the faculty at the Cleveland Institute of Music in 1991. During his tenure, he designed and experimentally evaluated a new variable acoustic modular performance shell (VAMPS) to provide variable local acoustics on stage. Following stage acoustic measurements at the Meyerhoff Symphony Hall in 2008, where Telarc was recording the Baltimore Symphony Orchestra, this new VAMPS design was installed to rave reviews from the orchestra and the conductor David Zinman.

Peter became Director of Research for a new company named RPG Acoustical Systems in 2017. He designed an Acoustical Research Center at the new facility incorporating a new experimental goniometer in addition to classical tools and the first virtual goniometer software (VIRGO), a Finite Element Model that predicts the polar responses and diffusion coefficient of a diffuser design. He also formed a company called REDI Acoustics with John Storyk and PK Pandy to create NIRO, the first AI Non-cuboid Iterative Room Optimizer software, to optimize critical listening rooms.

Beyond his professional accomplishments, Peter's original music library on Soundcloud and scholarly publications on Google Scholar serve as testaments to his enduring passion for both music and acoustics. His research methods have become the standards by which professionals and researchers around the world measure and model sound diffusion in rooms. His projects and publications established the state-of-the-art in the field of sound diffusion for decades. His willingness to discuss his research with students and practitioners in humble and forthright ways truly attests to his genuine and inspired desire to spread knowledge of architectural acoustics to the broadest possible audience. He has truly contributed in significant ways to the development of the "science of sound as it pertains to buildings" as defined by Wallace Clement Sabine.

Dr. D'Antonio constructively combined his passion for music and his diffraction physics experience to create an innovative career in architectural acoustics and pioneered the science of sound diffusion. His theories and innovations led to practical applications, transforming recording studios, educational facilities, worship spaces, performance venues, and home theaters. Peter was inducted into the recording industry's TECnology Hall of Fame in 2013. We are delighted and privileged that the Acoustical Society of America recognizes and honors Dr. Peter D'Antonio with this distinguished Wallace Clement Sabine Medal for contributions to the field of architectural acoustics.

NING XIANG
GARY W. SIEBEIN

R. BRUCE LINDSAY AWARD

Christopher Kube

2024

The R. Bruce Lindsay Award (formerly the Biennial Award) is presented in the Spring to a member of the Society who is no more than 10 years post terminal degree on 1 July at the time of Award acceptance and who, during a period of two or more years immediately preceding the award, has been active in the affairs of the Society and has contributed substantially, through published papers, to the advancement of theoretical or applied acoustics, or both. The award was presented biennially until 1986. It is now an annual award.

PREVIOUS RECIPIENTS

Richard H. Bolt	1942	Robert P. Carlyon	1994
Leo L. Beranek	1944	Beverly A. Wright	1995
Vincent Salmon	1946	Victor W. Sparrow	1996
Isadore Rudnick	1948	D. Keith Wilson	1997
J. C. R. Licklider	1950	Robert L. Clark	1998
Osman K. Mawardi	1952	Paul E. Barbone	1999
Uno Ingard	1954	Robin O. Cleveland	2000
Ernest Yeager	1956	Andrew J. Oxenham	2001
Ira J. Hirsh	1956	James J. Finneran	2002
Bruce P. Bogert	1958	Thomas J. Royston	2002
Ira Dyer	1960	Dani Byrd	2003
Alan Powell	1962	Michael R. Bailey	2004
Tony F. W. Embleton	1964	Lily M. Wang	2005
David M. Green	1966	Purnima Ratilal	2006
Emmanuel P. Papadakis	1968	Dorian S. Houser	2007
Logan E. Hargrove	1970	Tyrone M. Porter	2008
Robert D. Finch	1972	Kelly J. Benoit-Bird	2009
Lawrence R. Rabiner	1974	Kent L. Gee	2010
Robert E. Apfel	1976	Karim G. Sabra	2011
Henry E. Bass	1978	Constantin-C. Coussios	2012
Peter H. Rogers	1980	Eleanor P. J. Stride	2013
Ralph N. Baer	1982	Matthew J. Goupell	2014
Peter N. Mikhalevsky	1984	Matthew W. Urban	2015
William E. Cooper	1986	Megan S. Ballard	2016
Ilene J. Busch-Vishniac	1987	Bradley E. Treeby	2017
Gilles A. Daigle	1988	Yun Jing	2018
Mark F. Hamilton	1989	Adam Maxwell	2019
Thomas J. Hofler	1990	Julien Bonnel	2020
Yves H. Berthelot	1991	Likun Zhang	2021
Joseph M. Cuschieri	1991	Meaghan A. O'Reilly	2022
Anthony A. Atchley	1992	Julianna C. Simon	2023
Michael D. Collins	1993		

ENCOMIUM FOR CHRISTOPHER M. KUBE

...for contributions to the understanding of ultrasonic propagation and nonlinearity in polycrystalline materials.

15 MAY 2024 • OTTAWA, CANADA

Christopher Michael Kube grew up in Grand Island, the third largest city in Nebraska with a population of 50,000. Athletics, particularly running, was a big part of Christopher's growing up. He was a competitive runner, and after completing high school in Grand Island he attended nearby Hastings College on a track and cross-country scholarship. In between runs Christopher majored in Physics. For his senior project at Hastings College Christopher developed an acoustic levitation system using a $1000 budget and car audio amp borrowed from a friend, which opened his eyes to the field of acoustics.

Christopher's undergraduate experience with acoustics caught the attention of Professor Joseph Turner at the University of Nebraska-Lincoln (UNL) who recruited Christopher in 2008. He threw himself into the experimental challenges of his MS research project on ultrasonic measurement of stress in railroad rails, designing fixtures that attached magnetically and assembling the equipment necessary to make the measurements portable. The ultrasonic scattering response allowed Christopher to track the stress from thermal expansion surprisingly well over the length of a hot summer day. Over the course of this project, involving multiple trips to active rail lines in western Nebraska, Christopher came to the conclusion that the existing theory for inferring stress from ultrasound was inadequate. This motivated his interest in understanding and explaining how the polycrystalline nature of metals affects ultrasonic properties, which became the theme of his PhD research. Christopher's first major contributions in this area are notably a pair of papers published in the *Journal of the Acoustical Society of America (JASA)* in 2015 providing improved and accurate estimates for ultrasonic attenuation in polycrystals. Christopher's PhD research also produced very original work on estimating acoustoelasticity coefficients in polycrystalline and anisotropic solids. These parameters determine how stress affects ultrasound and conversely enable ultrasonic nondestructive evaluation (NDE) of *in situ* stress. Unquestionably the most significant result of Christopher's time at UNL was meeting a fellow graduate student in Turner's group, Andrea Arguelles, now wife, partner, collaborator and department colleague at Penn State, where they welcomed their son Jack in December during the same week as the Sydney meeting.

After his PhD in 2014 Christopher continued research in ultrasonics and nondestructive evaluation (NDE) at the U.S. Army Research Laboratory in Maryland. Notable among his achievements is a completely new theory for quantifying ultrasonic scattering from nonlinear inclusions. This work opens possibilities for NDE measurements based on localized nonlinearity of scatterers, whether they are impurities, welds or grains. In 2016 he proposed an "anisotropy index", a number that characterizes acoustic anisotropy that is applicable to any crystalline solid. In 2019 Christopher joined the Engineering Science and Mechanics department at Penn State University, where he is also a member of the Acoustics program. Although he remains an avid Cornhusker, his career so far at PSU has been tremendously productive. Not only has Christopher continued developing theories of nonlinear elastic waves and ultrasound in polycrystalline materials, but he has branched out into new challenging areas. Specifically, his initial research at the Applied Research Laboratory (ARL) on applications of ultrasonic NDE in additive manufacturing (AM) has blossomed in multiple directions. One example is application of ultrasonics to monitor laser generated melt pools, thereby providing a unique tool for studying solidification and microstructure formation in AM. Christopher's rapid rise to prominence in this important and evolving acoustics and materials science topic is reflected by the fact that he leads a Department of Energy project on ultrasonics for *in situ* material property monitoring in AM involving Carnegie Mellon University, the University of North Texas, and Westinghouse Electric Company. This level of leadership responsibility in a multi-institution effort is rare for an assistant professor. Other projects in ultrasonic applications in AM have been funded

by the Navy and 3M and his work in this area has been recognized by his selection for US Air Force Laboratory (AFRL) Summer Faculty Fellowships. Christopher is particularly successful in establishing productive scientific collaborations, an aspect of research that he impresses on his students. This success is partly explained by Christopher's congenial and affable nature but is mainly attributable to the respect he commands from his peers.

Christopher has a prolific publication record with 47 journal articles to date. The ASA is his preferred venue, with 22 papers in JASA and 7 *in JASA Express Letters*. The number of fundamental papers on ultrasonic attenuation and nonlinear effects in polycrystalline materials is quite remarkable. Chris is also active in the ultrasonics and nondestructive testing communities. He serves as an associate editor of *Ultrasonics*, was invited to be editor for a special issue of *Nondestructive Testing and Evaluation International* on additive manufacturing and is now a member of the journal's editorial board.

His research contributions in ultrasonics have been recognized by the American Society of Nondestructive Testing through the Young NDT Professional Award in April 2020 and the Research in Nondestructive Evaluation Outstanding Journal Article, 2015. It is no surprise that Christopher is also an excellent teacher, as evidenced by the 2020 award of the Hastings College Outstanding Alumni Award for Teaching. Paraphrasing one eminent member of ASA, Christopher has an outstanding balance of intellectual ability and patience with a natural inquisitiveness, and quoting another, succinctly, "he is a class act."

Christopher's history of involvement with the Acoustical Society of America is spectacular. He has been a member since 2009 when as an MS student he attended and delivered a talk at the 158th meeting. Fast forward to 2023 when ASA members elected him to chair the Physical Acoustics Technical Committee. This trajectory is remarkable considering that Christopher is an assistant professor and it speaks volumes about his recognition and reputation within the Society. Christopher is also a member of the Structural Acoustics and Vibration Technical Committee and has reviewed for JASA and JASA-EL as well as many other journals. He has chaired and organized special sessions, e.g., Frontiers of Resonant Ultrasound Spectroscopy and its Applications and Nonlinear Acoustics in Solids for the fall 2022 and 2023 meetings. Two of his undergraduate students received the ASA Robert W. Young Award. ASA is clearly Christopher's home professional society, and he has proven himself to be a good citizen in terms of his service within both the national and international acoustics communities. His productivity in terms of the considerable number of substantial journal articles over the past eight years since receiving his PhD is extraordinary for a theoretician. Christopher is a true acoustician whose career is on a remarkable trajectory, embodying the spirit of this award. Therefore, we are proud to present Christopher the 2024 R. Bruce Lindsay Award.

ANDREW N. NORRIS

Helmholtz-Rayleigh Interdisciplinary Silver Medal
in
Computational Acoustics, Physical Acoustics, and Engineering Acoustics

D. Keith Wilson

2024

The Silver Medal is presented to individuals, without age limitation, for contributions to the advancement of science, engineering, or human welfare through the application of acoustic principles, or through research accomplishment in acoustics.

PREVIOUS RECIPIENTS

Helmholtz-Rayleigh Interdisciplinary Silver Medal

Gerhard M. Sessler	1997	James E. Barger	2011
David E. Weston	1998	Timothy J. Leighton	2013
Jens P. Blauert	1999	Mark F. Hamilton	2014
Lawrence A. Crum	2000	Henry Cox	2015
William M. Hartmann	2001	Armen Sarvazyan	2016
Arthur B. Baggeroer	2002	Blake S. Wilson	2017
David Lubman	2004	Kenneth S. Suslick	2018
Gilles A. Daigle	2005	Barbara G. Shinn-Cunningham	2019
Mathias Fink	2006	Michael R. Moldover	2021
Edwin L. Carstensen	2007	George L. Augspurger	2022
James V. Candy	2008	Vera A. Khokhlova	2023
Ronald A. Roy	2010		

Interdisciplinary Silver Medal

Eugen J. Skudrzyk	1983
Wesley L. Nyborg	1990
W. Dixon Ward	1991
Victor C. Anderson	1992
Steven L. Garrett	1993

CITATION FOR D. KEITH WILSON

...for contributions to computational acoustics, atmospheric acoustics, and national defense and security

15 MAY 2024 • OTTAWA, CANADA

D. Keith Wilson earned an M.S. in Electrical Engineering from the University of Minnesota in 1987, where he first became interested in acoustics under Professor Robert Lambert, and a PhD in Acoustics from Pennsylvania State University in 1992, where his advisor was Professor Dennis Thompson. In his PhD dissertation he formulated theoretical principles of acoustic tomography of the atmosphere and carried out its experimental implementation. Since Keith's pioneering work, acoustic tomography has been used in several countries for remote sensing of the atmosphere and, also, to monitor temperature and air flow in closed environments such as boiler rooms and large halls. Keith was awarded the R. Bruce Lindsay Award from the ASA in 1997 for developing acoustic tomography of the atmosphere.

Upon completion of his PhD, Keith joined the Woods Hole Oceanographic Institution as a research fellow (1991-1993) under Dr. George Frisk and then became a member of the research faculty at the Pennsylvania State University Meteorology Department (1993-1995) under Professor John Wyngaard. The latter appointment and his years as a PhD student were particularly beneficial because they provided Keith with the opportunity to study atmospheric boundary layer (ABL) meteorology. Later, Keith used this knowledge to express the variances and outer length scales of temperature and wind velocity fluctuations in terms of the meteorological parameters of the ABL. His approach for modeling atmospheric turbulence has been widely used for near-ground sound propagation, auralization of flying aircraft, source localization, and the effect of turbulence on sonic boom disturbances. Many acousticians credit Keith for bringing ABL meteorology to atmospheric acoustics.

In 1995 Keith joined the U.S. Army Research Laboratory (ARL), near Washington, DC, as a physical scientist. Although his work at the ARL was rewarding and productive, small-town life in New England was attractive from a family perspective. So, Keith joined the Cold Region Research and Engineering Laboratory (CRREL), part of the U.S. Army Engineer Research and Development Center (ERDC), in Hanover, NH in 2002, where he has been working ever since.

Keith has made other outstanding contributions to atmospheric acoustics. He employed the relaxation model to describe sound interactions with the ground, which is usually modelled as a rigid-porous material. The theory developed is now known as *Wilson's relaxation model*, which is one of the main approaches for sound interactions with the ground. The ongoing revision of the ANSI S1.18 *Method for determining ground impedance* will recommend using Wilson's model.

Keith was among the first to *quantify uncertainties in outdoor sound propagation*. He used sophisticated methods for sampling random parameters of the problem such as stratified, Latin-hypercube, and importance sampling. Keith was also the first to recognize the potential in machine learning methods for fast predictions of outdoor sound propagation. His results have been used in predicting absorption/transmission properties of sound insulating media, wind farm noise, and infrasound propagation.

Keith has contributed significantly to modern computational atmospheric acoustics. In addition to machine learning and quantification of uncertainties, he developed a finite-difference time-domain algorithm for solving linearized fluid dynamics equations, which has been widely used in atmospheric acoustics and other fields. Also, Keith collaborated on the most advanced version of the parabolic-equation code, which correctly accounts for the temperature and wind velocity profiles, atmospheric turbulence, impedance ground, terrain elevations, wide-angle propagation, vector character of the wind velocity, and uncertainty.

Keith has made important contributions to battlefield acoustics and sensing. His work on national defense and security has been recognized by many distinguished awards from ARL, CRREL, and ERDC, including the prestigious Superior and Meritorious Civilian

Service Awards and recognition as a Fellow of the Military Sensing Symposia. One of his most notable contributions was a theoretical model for the performance of acoustic arrays operating in the atmosphere, including both the effects of turbulence and signal-to-noise ratio. Another important contribution is the development of the software Environmental Awareness for Sensor and Emitter Employment (EASEE), which models atmospheric and terrain impacts on sensor coverage. The EASEE software has been used by all five DoD services and several intelligence organizations for applications such as installation security, border protection, routing of aircraft, identifying coverage gaps in networks, and optimization of sensor types and locations.

Keith keeps a very busy schedule, managing from six to eight projects a year, involving several researchers. This requires extensive administrative work and travel. Yet Keith is remarkably productive as a researcher. People who know him closely are truly amazed that he can accomplish so many tasks. In addition to long hours, he works productively in airports and hotel rooms. Keith's hobbies include growing dahlias, listening to 1960's and classical music, and reading about history and physics. Keith's wife, Nancy, a music teacher, has provided unwavering support throughout his career, especially when he worked late or was away for meetings.

It is safe to say that ASA is Keith's *home*. He attends almost every ASA meeting with multiple presentations, including numerous invited talks. He has organized many special sessions. Most of his peer-reviewed articles are in *JASA* and *JASA EL*. He has been an Associate Editor for *JASA* and *JASA EL* for more than 20 years and served as a Chair of the Publication Policy Committee for six years.

Two of Keith's contributions to the ASA have already enormously benefited the Society and will continue doing so for years to come. He was the Founding Editor of *JASA EL* and served as its Editor in 2005-2009, leading the transition of *Acoustics Research Letters Online (ARLO)*, a former rapid review and publication Letters section of *JASA,* into a stand-alone publication under the *JASA EL* name. In 2018, Keith founded the new ASA Technical Specialty Group Computational Acoustics which has since been granted full status as a TC; the first new TC in 30 years. The creation of TCCA has also resulted in the new sections entitled *Computational Acoustics* in *JASA* and *JASA EL.* These sections have become increasingly popular and have attracted new authors (and readers) who would otherwise publish elsewhere.

In recognition of the above-mentioned contributions and achievements, the ASA honors Keith Wilson with the Helmholtz-Rayleigh Interdisciplinary Silver Medal in Computational Acoustics, Physical Acoustics, and Engineering Acoustics.

VLADIMIR E. OSTASHEV
KEITH ATTENBOROUGH
R. DANIEL COSTLEY

Gold Medal

Ingo R. Titze
2024

The Gold Medal is presented in the spring to a member of the Society, without age limitation, for contributions to acoustics. The first Gold Medal was presented in 1954 on the occasion of the Society's Twenty-Fifth Anniversary Celebration and biennially until 1981. It is now an annual award.

PREVIOUS RECIPIENTS

Wallace Waterfall	1954	Ira Dyer	1996
Floyd A. Firestone	1955	K. Uno Ingard	1997
Harvey Fletcher	1957	Floyd Dunn	1998
Edward C. Wente	1959	Henning E. von Gierke	1999
Georg von Békésy	1961	Murray Strasberg	2000
R. Bruce Lindsay	1963	Herman Medwin	2001
Hallowell Davis	1965	Robert E. Apfel	2002
Vern O. Knudsen	1967	Tony F. W. Embleton	2002
Frederick V. Hunt	1969	Richard H. Lyon	2003
Warren P. Mason	1971	Chester M. McKinney	2004
Philip M. Morse	1973	Allan D. Pierce	2005
Leo L. Beranek	1975	James E. West	2006
Raymond W. B. Stephens	1977	Katherine S. Harris	2007
Richard H. Bolt	1979	Patricia K. Kuhl	2008
Harry F. Olson	1981	Thomas D. Rossing	2009
Isadore Rudnick	1982	Jiri Tichy	2010
Martin Greenspan	1983	Eric E. Ungar	2011
Robert T. Beyer	1984	William A. Kuperman	2012
Laurence Batchelder	1985	Lawrence A. Crum	2013
James L. Flanagan	1986	Brian C. J. Moore	2014
Cyril M. Harris	1987	Gerhard M. Sessler	2015
Arthur H. Benade	1988	Whitlow W. L. Au	2016
Richard K. Cook	1988	William M. Hartmann	2017
Lothar W. Cremer	1989	William A. Yost	2018
Eugen J. Skudrzyk	1990	William J. Cavanaugh	2019
Manfred R. Schroeder	1991	Judy R. Dubno	2020
Ira J. Hirsh	1992	James F. Lynch	2021
David T. Blackstock	1993	Michael J. Buckingham	2022
David M. Green	1994	Mark F. Hamilton	2023
Kenneth N. Stevens	1995		

ENCOMIUM FOR INGO R TITZE

...for contributions to understanding human voice production and the development of clinical applications.

15 MAY 2024 • OTTAWA, CANADA

Ingo R. Titze was born in East Germany. He and his family moved to West Germany as refugees to the small town of Werdohl, where they lived for ten years, and then emigrated to the United States, settling in Salt Lake City, UT. It was here that Ingo attended high school and later earned Bachelor's and Master's degrees in Electrical Engineering from the University of Utah.

Following graduation, Ingo was employed for two years by North American Aviation (later North American Rockwell) in Tulsa, OK, where he worked on radar absorptive materials for nose cones of aircraft and applications for space exploration. He then spent two years working at the Boeing Company in Seattle, WA. Ingo eventually pursued a Ph.D. in Physics at Brigham Young University (BYU) in Provo, UT with the goal of combining his scientific curiosity with his lifelong passion for singing.

Ingo received his Ph.D. in 1973, and then served a short stint as Instructor of Physics at Pomona College before accepting his first appointment as Assistant Professor at the University of Petroleum and Minerals in Saudi Arabia. From 1976 to 1979, Ingo was an Assistant Professor at Gallaudet College and then moved to the University of Iowa (UI) in 1979 where he was named a UI Foundation Distinguished Professor in 1995. Ingo retired from the University of Iowa in 2019 and is currently engaged in research at the Utah Center for Vocology at the University of Utah. He also serves as the Chair of the board of directors for the National Center for Voice and Speech, a non-profit research, training, and dissemination enterprise begun in 1990.

Ingo was elected a Fellow of the ASA in 1983 and was awarded the ASA Silver Medal in Speech Communication in 2007. For more than four decades he has contributed to our scientific knowledge of voice production by painstakingly applying the principles of physics to understanding the aerodynamic, mechanical, and acoustic nature of vocal fold vibration. His work has greatly expanded our knowledge of the intricacies of how humans generate voiced sounds for purposes of communication and musical expression, while simultaneously laying the foundation for innovative clinical treatments of voice disorders. More recently Ingo has applied his vast knowledge of the human voice to understanding sound production in the animal world.

Among many landmark findings published in several hundred journal articles, Ingo's research legacy is his refinement of the "myoelastic-aerodynamic theory of phonation." Although the theory was so named by Janwillem van den Berg in 1958, it was Ingo who demonstrated mathematically how self-oscillation depends on the phase relations between the aerodynamic driving pressures acting on the vocal folds and the velocity components of the tissue movement. He showed that these conditions are facilitated by an aerodynamically induced biomechanical wave in the mucosal tissue of the vocal folds. Another of Ingo's major theoretical insights was the effect of the acoustic reactance of the vocal tract on the self-oscillation of the vocal folds. His legacy is further bolstered by investigations into how the fundamental frequency of vocal fold vibration and vocal intensity are controlled, how certain aspects of the laryngeal system differ across males and females, and the establishment of the concept of phonation threshold pressure.

Ingo's explication of the physical nature of the voice has resulted in far-reaching effects on voice science, voice care and therapy, and voice training. Through computational modeling, he has developed a system that simulates the biomechanics and acoustics of voice production allowing researchers to conduct virtual experiments with a wide range of parametric variation. Ingo's clear explanations of the complementary mechanisms of self-oscillation have strongly influenced the direction of voice research over the past 30 years, and his research has facilitated developments in speech synthesis, speaker identification, voice quality, and speech transformation. His work has also provided a theoretical basis for voice therapy techniques, guidance for laryngological interventions (e.g., surgery, injections, etc.), and informs voice coaches and trainers as they educate singers, entertainers, teachers, and other professional voice users. In addition, Ingo played a pivotal role in founding a new subfield called "vocology," which is dedicated to the care and treatment of voice disorders and the training of professional voice users.

Ingo has educated hundreds of students, clinicians, physicians, voice teachers, and professional vocalists about the science of the voice through his presentations in courses, conferences, workshops, and summer programs. Ingo is also an exquisite mentor who motivates students by sharing his own excitement about the next new thing that might be learned about how the voice works. His relentless enthusiasm is contagious. His book *Principles of Voice Production* was written specifically for a diverse audience so that highly theoretical research on the mechanics of voice production could be understood by those with less technical backgrounds. His more advanced book, *The Myoelastic Aerodynamic Theory of Phonation* is a classic exposition of theories and research of phonatory mechanics, aerodynamics, modeling, and simulation.

Ingo also developed the Summer Vocology Institute (SVI) that offers coursework for students and practicing professionals in voice science, instrumentation, and voice habilitation. The summer of 2024 will mark the 25th year of the SVI, with Ingo having served as the primary instructor. He has also taken leadership roles in organizing many conferences, served as an associate editor for the National Association of Teachers Singing Journal from 1986 to 2023, and reviewed hundreds of manuscripts for academic journals including JASA and JASA-EL. Ingo has served in several roles for the National Institutes of Health. He was on the Sensory Disorders and Language Study Section from 1986-1990, served as Chair of the Voice Panel during the planning of a National Strategic Research Plan in 1988, was a member of the task force charged with reorganizing the behavioral research study section in 1998-1990, and was a member of the prestigious Advisory Council for the National Institute on Deafness and Other Communication Disorders (NIDCD) from 2000 to 2004. In 2015, Ingo founded and served as President of the Pan American Voice Association, whose mission is to advance the scientific and interdisciplinary study of vocalization across species in all countries of the Western Hemisphere through research, training, and dissemination of knowledge.

At the 1993 fall meeting of the ASA in Denver, Colorado, Ingo served the Society in a unique way. At the plenary session held in the Boettcher Concert Hall at the Denver Center for the Performing Arts, he presented a show called ``Voices of People and Machines.“ It was open to the public and attracted hundreds of students from the Denver area schools, The show was part education, part music, part comedy, and culminated with Ingo (himself a fine tenor) singing an operatic duet with a numerically simulated voice coupled with an animated face called “Pavarobotti.“ It was a technically complex presentation to execute and posed a high risk of failure, but he and his team made it a success. There would be few other ASA plenary sessions in which one of our members took acoustics straight to the public quite as boldly as Ingo did at that ASA meeting in 1993.

In sum, Ingo Titze’s research and educational contributions, and the development of Vocology, have strongly shaped and directed theoretical, experimental, and clinical voice science over the past four decades. He loves learning, he loves teaching what he learns to others, and he inspires all those around him to pursue and produce new knowledge. He is a most deserving recipient of the Gold Medal of the Acoustical Society of America.

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