

R. BRUCE LINDSAY AWARD



Likun Zhang

2021

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



CITATION FOR LIKUN ZHANG

...for contributions to the understanding of radiation pressure, acoustofluidics and the interaction between fluid flows and acoustic fields

ACOUSTICS IN FOCUS • 4 JUNE 2021

Likun Zhang was born in the coastal city of Quanzhou City in the south-eastern region of China to a family with 20 generations of history in the region. Citizens of Quanzhou are no strangers to the wider world as it is home to one of the most important ports in China and was a key hub to the Maritime Silk Road connecting disparate lands to China since around the 11th century. Although his parents did not have the opportunity to attend school themselves, they well understood the importance of education and supported Likun from his elementary school days when he showed an early aptitude and passion for math and science. His hard work paid off as he was selected out of thousands of students to be the only one from his middle school to attend the top high school in the city. Continuing his success, he was admitted to the highly selective Nanjing University where he earned both B.S. and M.S. degrees in Acoustics in 2003 and 2007, respectively. It was at Nanjing University that Likun first became fascinated by acoustics, waves, and vibration – particularly non-linear phenomena. For his Master's project, he joined the Physical Acoustics Group founded by Professor Rongjue Wei where he studied bifurcation of a parametrically excited solitary wave in a water tank which was ultimately published in *Physical Review E*. From there, it was on to join the Ph.D. program in the Physics Department at Washington State University (WSU) in the United States.

Likun joined Professor Phil Marston's research group at WSU in 2008 as a Ph.D. candidate. Dr. Marston put him straight to work on an acoustic radiation torque problem extending work he had published on a sphere in a Bessel beam. Likun impressed Dr. Marston by quickly discovering a typo in one of the equations in his manuscript, but that was only the beginning of Likun's impressive discoveries. It did not take long for Likun to derive a generalized expression for the solution that applied for not only a sphere, but any axisymmetric geometry on the beam axis. And not long after that, Likun was able to derive an expression for the power absorption for the spherical case. This impressive work was presented over several Acoustical Society of America (ASA) meetings and ultimately published in both the *Journal of the Acoustical Society of America (JASA)* and *Physical Review E*. Not bad for a first-year student! Likun kept impressing over his remaining Ph.D. years at WSU. Another significant project focused on the geometrical interpretation of negative radiation forces – or acoustic tractor beams. This work also resulted in publications in *JASA* and *Physical Review E* and has influenced the nonlinear optics community. As if these contributions weren't enough for a Ph.D., Likun also worked on viscous and scattering effects in the context of acoustic radiation forces ultimately publishing eight or nine manuscripts in highly rated journals which have been well cited in subsequent years.

Likun's success at WSU made him an excellent candidate for ASA's Frederick V. Hunt Postdoctoral Research Fellowship in Acoustics. The Hunt Fellowship is an extremely selective program which funds a 12-month postdoctoral fellowship under the supervision of a prestigious scientist. Likun was selected as a Hunt Fellow for 2013-2014 to work with Professor Harry Swinney at the University of Texas at Austin. Dr. Swinney is well known in the physics community as an incredibly creative physicist who works primarily in fluids and nonlinear dynamics, but has quite a range of interests. Under Dr. Swinney, Likun began working on interesting problems of acoustic waves propagating in stratified fluids containing internal gravity waves. A similar system occurring in nature are internal waves in oceans generated from tidal flow over topographic features on the ocean floor. These dynamics are thought to play an important role in the ocean mixing process. Likun expanded his skill set and built an elegant experiment to study such a system which included both periodic and random "ocean floor" topographic features. This work was published in both *JASA* and *Journal of Geophysical Research: Oceans*.

After much hard work and excellent mentorship, Likun was a competitive candidate for a tenure track position. Ultimately, he chose to join the Physics Department at the University of Mississippi (UM) and was invited to establish his research home at the National Center for Physical Acoustics (NCPA) at UM in 2016. Likun quickly went to work assembling and growing a research group and building his laboratory at the NCPA while continuing his work on ocean acoustics, radiation pressure problems, and acoustofluidics. His research interests have broadened in recent years. A particularly interesting project is entitled 3D Seismic Oceanography: The New Frontier in Water Column Exploration in which the team partnered with a petroleum exploration company to explore old data sets. The goal is to extract 3-D structural information on the water column between the surface, from which acoustic pulses originated, to the ocean floor. The company, of course, was interested in segments of data associated with subfloor propagation, but the full data set includes information about the water column. If successful, the methodology could extract valuable ocean structure information from oceans of existing data sitting on the shelves. Other active areas of research for Likun are passive acoustic techniques for detecting and characterizing methane leaks on the ocean floor, capillary-gravity wave interactions at fluid-structure interfaces, and acoustic tractor beams to manipulate fluids in reduced gravity which is being supported by NASA.

In addition to his stellar scholarship, Likun has been an active ASA member as well as in the broader professional community. He has organized and chaired numerous special sessions at ASA meetings, served as a Poster Session judge several times, contributed to the ASA International Liaison Committee, acted as Coordinating Editor in Physical Acoustics for *JASA*, and served as reviewers for both *JASA* and *JASA-EL*. More broadly, he has served as a reviewer for over a dozen other journals, participated in the Physical Acoustics Summer School, and instructed at the Hands-on Research in Complex Systems Summer School. At UM, he has mentored (or is mentoring) two postdoctoral fellows, four Ph.D. students, three M.S. students and four undergraduate students as well as hosting two visiting scholars to his laboratory.

It is not practical in this brief space to fully capture Dr. Likun Zhang's impact on the acoustics and scientific community; however I believe it is clear that, even at this early stage of his career, he has made significant contributions. I look forward to watching his growth in the coming years and trying to keep up with his rapidly developing research program.

J. R. (JOSH) GLADDEN