



Professor Isaac Elishakoff

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This Festschrift issue is composed of some papers that were delivered at the “Symposium on Stability, Structural Reliability, and Random Vibrations in Honor of Professor Isaac Elishakoff,” which took place at the American Society of Mechanical Engineers (ASME) International Mechanical Engineering Congress and

Exposition (IMECE) in Lake Buena Vista, Florida in November 2009, in recognition of Dr. Elishakoff's 65th birth anniversary.

Three keynote lectures were allotted, namely Dr. Masanobu Shinozuka, distinguished professor and chairman of the Department of Civil and Environmental Engineering at the University of Southern California, Irvine; Dr. Marco Amabili, Canada chair professor of McGill University, Montreal, Canada; and Professor Dumitru Caruntu from the University of Texas-Pan American. In addition, 18 lectures were delivered by authors representing 10 countries namely the United States, Canada, Israel, Italy, Germany, the Netherlands, South Africa, Puerto Rico, the People's Republic of China, and Cyprus.

Dr. Isaac Elishakoff serves as the distinguished research professor of the Department of Ocean and Mechanical Engineering at Florida Atlantic University. He also holds a courtesy appointment as a professor in the Department of Mathematical Sciences. He was born in Kutaisi, Republic of Georgia on February 9, 1944. Professor Elishakoff holds a Ph.D. in dynamics and strength of machines from the Power Engineering Institute and Technical University in Moscow, Russia (1971). Prior to joining the Florida Atlantic University, he taught one year in the Abkhazian University, Sukhumi, Republic of Georgia and 18 years at the Technion-Israel Institute of Technology in Haifa where he became a professor of aerospace engineering in 1984. He also occupied several visiting positions. He was an inaugural holder of the Frank M. Freimann Chair Professorship of Aerospace and Mechanical Engineering at the University of Notre Dame, Indiana during the academic year 1985/86; as well as the Henry J. Massman, junior chair professorship of Civil Engineering during the Fall Semester, 1986/87. He was a visiting Castigliano distinguished professor in University of Palermo, Italy during March 1992. During the academic year 1979-1980, he served as visiting associate professor at the Delft University of Technology in the Netherlands. In 1987, he served as a visiting professor at the Naval Postgraduate School in Monterey, California. In summers of 1990 and 1991, he was a visiting professor of aerospace engineering at the Delft University of Technology, the Netherlands, where in July 2000 served as an inaugural holder of the W. T. Koiter Chair Professorship (Mechanical Engineering Department); in the summers of 2005 and 2010, he served as a visiting professor at the University of Rome, "La Sapienza" and University of Bologna, Italy. During December-January 1992 and December 2006-February 2007, he served as a fellow of the Japan Society for Promotion of Science, at the Universities of Tokyo and Kyoto, respectively. During April/May 2007, December 2009/January 2010, and December 2010, he served as a visiting eminent scholar at the Beijing University of Aeronautics and Astronautics, the People's Republic of China.

Dr. Elishakoff is a recipient of the Bathsheba de Rothschild prize, as well as fellowships from the German Academic Exchange Office, and the National Technical Foundation of the Netherlands. He was presented special medallions of the University of Notre Dame and of the University of Tokyo. During the years 1996-2002, he was appointed as an ASME distinguished lecturer.

In 1991 Dr. Elishakoff was elected as a fellow of American Academy of Mechanics. In 2010, he was elected as a foreign member of the Georgian National Academy of Sciences. In 2011 he was elected as the Member of the European Academy of Sciences and Arts, as well as the Fellow of the ASME (American Society of Mechanical Engineers). His research activities were supported at various periods by NSF, NASA Kennedy Space Center, NASA Langley Research Center, NASA Glenn Research Center, ICASE-NASA Institute for Computer Applications in Science and Engineering, National Center for Earthquake Engineering Research, and Center of Ocean Energy.

Dr. Elishakoff has made pioneering contributions in several areas:

- (1) random vibrations, with special emphasis on continuous, homogeneous, and composite beams, plates and shells, and associated effects of refinements in theories and of cross-correlations;
- (2) free vibration of structures with the generalization of Bolotin's dynamic edge effect method, free of degeneracy property characteristic to the original method;
- (3) nonlinear buckling of structures, with a new method to combine the results of experimental measurements of shell imperfections to predict the theoretical knockdown factors associated with different manufacturing processes;
- (4) structural reliability with elucidation of errors associated with various low-order approximations and human errors;
- (5) work on a nonprobabilistic theory for treating uncertainty in mechanics, namely, optimization and anti-optimization under uncertainty and, especially, its combination with stochastic modeling;
- (6) dynamic stability of structures with imperfections, in elastic or viscoelastic setting;
- (7) random vibrations and reliability of composite structures with attendant first book worldwide;
- (8) development of the improved finite element method for stochastic structures, which has a nonperturbative nature;
- (9) stochastic linearization;
- (10) computerized symbolic algebra;
- (11) coauthored the first and only monograph worldwide on convex modeling of uncertainty;
- (12) coauthored the first and only monograph worldwide on reliability of composite structures;
- (13) coauthored the first and only monograph on acoustically excited structures;
- (14) coauthored the first and only monograph on uncertain instability problems;
- (15) authored the first and only monograph on exact solutions for inhomogeneous structures; and
- (16) authored the first and only monograph in English on safety factors.

Dr. Elishakoff has published about 370 original papers in leading national and international journals and conference proceedings. His publications appeared mostly in ASME Journal of Applied Mechanics; Proceedings of the Royal Society of London; AIAA Journal; International Journal of Solids and Structures; Journal of Sound and Vibration; Journal Mathematical Problems in Engineering; Acta Mechanica; Journal of Composite Structures ; Computer Methods in Applied Mechanics and Engineering; Computers and Structures; Journal of Acoustical Society of America; Chaos, Solitons & Fractals; Meccanica, and many others.

In addition to extensive research, he has developed numerous undergraduate and graduate courses, including apparently the first engineering course worldwide "Design for Homeland Security." Dr. Elishakoff is general advisory editor for publications on Vibration, Stability and Reliability for the series "Studies in Applied Mechanics" and "Developments in Civil Engineering" of Elsevier Science Publishers, Oxford, England; book review editor of the "Journal of Shock and Vibration"; he is associate editor of four journals:

- (1) International Journal of Mechanics of Machines and Structures;
- (2) Applied Mechanics Reviews of the ASME;
- (3) Interdisciplinary Journal of Nonlinear Sciences "Chaos, Solitons and Fractals" of Pergamon Press; and
- (4) Mechanics-Based Design of Structures and Machines of Taylor and Francis.

He is on editorial boards of following seven journals:

- (1) Journal of Sound and Vibration;
- (2) The Shock and Vibration Digest;
- (3) Trends in Acoustical Research;
- (4) The Uncertainties in Engineering Mechanics Journal;
- (5) International Journal of Structural Stability and Dynamics;

- (6) Ocean Engineering Systems;
- (7) International Journal of Safety and Homeland Security. In the past, he served also on boards of
- (8) Probabilistic Engineering Mechanics;
- (9) Journal of Symbolic Computation; and
- (10) Computers and Structures.

In 1986, Dr. I. Elishakoff co-organized the

- (a) European Mechanics Colloquium on “Refined Dynamical Theories of Beams, Plates and Shells, and Their Applications” in Kassel, Federal Republic of Germany.
- (b) In 1990, he co-organized the Second International Conference on Stochastic Structural Dynamics, in Boca Raton, Florida. In 1990, he co-organized the Symposium on “Symbolic Computations and Their Impact on Mechanics” at the 111th Winter Annual Meeting of the ASME, in Dallas, TX.
- (c) In 1992, he co-organized a joint FAU-University of Federal Armed Forces- Hamburg (FRG) Conference on “Recent Developments in Solid Mechanics.”
- (d) In 1996, he organized an “International Conference on Uncertain Structures” in Miami and Western Caribbean.
- (e) In 1997, he coordinated a special course, “Uncertainty in Engineering Probability, Fuzziness and Anti-Optimization” in the International Centre for Mechanical Sciences (CISM), in Udine, Italy, within its Hertz Session. He also has organized numerous sessions at national and international meetings worldwide, including the sessions at the ASME meetings.
- (f) In 2001, he co-organized a special course, “Stability of Structures: Modern Problems and Unconventional Solutions” at CISM, Udine, Italy.
- (g) In 2005, he organized a special course “Mechanical Vibrations: Where Do We Stand?” at CISM, Udine, Italy.
- (h) In 2011, he is co-organizing a special course in “Nondeterministic Mechanics,” at CISM, Udine, Italy.

Dr. Elishakoff has lectured at about 200 national and international meetings and seminars, including over 36 special invited lectures and 16 keynote lectures. He also has lectured worldwide in Europe, North and South America, Middle East, and Far East.

Dr. Elishakoff is the author or coauthor of the following nine monographs:

1. I. Elishakoff, Probabilistic Theory of Structures (Wiley-Interscience, New York, 1983), (second edition: Dover Publications, Mineola, New York, 1999).
2. Y. Ben-Haim and I. Elishakoff, Convex Models of Uncertainty in Applied Mechanics (Elsevier Science Publishers, Amsterdam, The Netherlands, 1990).
3. G. Cederbaum, I. Elishakoff, J. Aboudi and L. Librescu, Random Vibrations and Reliability of Composite Structures (Technomic Publishers, Lancaster, PA, 1992).
4. I. Elishakoff, Y. K. Lin and L. P. Zhu, Probabilistic and Convex Modeling of Acoustically Excited Structures (Elsevier Science Publishers, Amsterdam, the Netherlands, 1994).
5. I. Elishakoff, Y. W. Li and J. H. Starnes, Jr., Nonclassical Problems in the Theory of Elastic Stability (Cambridge University Press, Cambridge, 2001).
6. I. Elishakoff and Y. J. Ren, Large Variation Finite Element Method for Stochastic Problems (Oxford University Press, Oxford, UK, 2003).
7. I. Elishakoff, Safety Factors and Reliability: Friends or Foes? (Kluwer Academic Publishers, Dordrecht, the Netherlands, 2004).
8. I. Elishakoff, Eigenvalues of Inhomogeneous Structures: Unusual Closed-Form Solutions (CRC Press, Boca

Raton, 2004).

9. I. Elishakoff and M. Ohsaki, Optimization and Anti-Optimization of Structures under Uncertainty (Imperial College Press, London, 2010).

He also coedited the following 13 volumes:

1. I. Elishakoff and H. Lyon (Eds.), Random Vibration — Status and Recent Developments (Elsevier Science Publishers, Amsterdam, 1986).
2. I. Elishakoff and H. Irretier (Eds.), Refined Dynamical Theories of Beams, Plates and Shells, and Their Applications (Springer-Verlag, Berlin, 1987).
3. I. Elishakoff, J. Arbocz, Ch. D. Babcock, Jr. and A. Libai (Eds.), Buckling of Structures — Theory and Experiment (Elsevier Science Publishers, Amsterdam, 1988).
4. S. T. Ariaratnam, G. Schuëller and I. Elishakoff (Eds.), Stochastic Structural Dynamics — Progress in Theory and Applications (Elsevier Applied Science Publishers, London, 1988).
5. C. Mei, H. F. Wolfe and I. Elishakoff (Eds.), Vibration and Behavior of Composite Structures (ASME Press, New York, 1989).
6. F. Casciati, I. Elishakoff and J. B. Roberts (Eds.), Nonlinear Structural Systems under Random Conditions (Elsevier Science Publishers, Amsterdam, 1990).
7. D. Hui and I. Elishakoff (Eds.), Impact and Buckling of Structures (ASME Press, New York, 1990).
8. A. K. Noor, I. Elishakoff and G. Hulbert (Eds.), Symbolic Computations and Their Impact on Mechanics (ASME Press, New York, 1990).
9. Y. K. Lin and I. Elishakoff (Eds.), Stochastic Structural Dynamics — New Theoretical Developments (Springer, Berlin, 1991).
10. I. Elishakoff and Y. K. Lin (Eds.), Stochastic Structural Dynamics — New Applications (Springer, Berlin, 1991).
11. I. Elishakoff (Ed.), Why's and How's in Uncertainty Modeling (Springer, Vienna, 1999).
12. A. P. Seyranian and I. Elishakoff (Eds.), Modern Problems of Structural Stability (Springer, Vienna, 2002).
13. I. Elishakoff (Ed.), Mechanical Vibration: Where Do We Stand? (Springer, Vienna, 2007).

Presently, Dr. Elishakoff is composing monographs titled

(1) “Mechanics of Carbon Nanotubes and Nanosensors, Vibration, Buckling, Ballistic Impact, and Bacterium/Virus Identification” (with D. Pentaras et al.) and

(2) “Follower Forces: Fact or Fancy?”

His complete dedication to science and his students are phenomenal. We wish Isaac many more decades of robust health and continuing making seminal contributions to the field of theoretical and applied mechanics.

-----Marco Amabili (1) and Dumitru I. Caruntu (2)

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