

Ellis B. Stouffer Distinguished Lecture
Department of Mathematics
University of Kansas

Long Time Behavior of Solutions to
Flow-Structure Interactions Arising in
Modeling of Subsonic and Supersonic Flows of Gas

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and University of Virginia

Tuesday, December 3, 2013
4:00 pm
306 Snow Hall
Aronszajn Seminar Room

An appearance of flutter in oscillating structures is an endemic phenomenon. Most common causes are vibrations induced by the moving flow of a gas which is interacting with the structure. Typical examples include: turbulent jets, vibrating bridges, oscillating facial palate in the onset of apnea. The intensity of the flutter depends heavily on the speed of the flow (subsonic, transonic or supersonic regimes). Thus, reduction or attenuation of flutter is one of the key problems in aeroelasticity with application to a variety of fields including aerospace engineering, structural engineering, medicine and life sciences. Mathematical models describing this phenomenon involve coupled systems of partial differential equations (Euler Equation and nonlinear plate equation) with interaction at the interface - which is the boundary surface of the structure. The aim of this talk is to present a mathematical theory describing: (1) qualitative properties of the resulting dynamical systems (existence, uniqueness and robustness of weak solutions), (2) asymptotic stability and associated long time behavior that includes the study of global attractors, (3) feedback control strategies aiming at the elimination or attenuation of the flutter.

Irena Lasiecka joined the Department of Mathematical Sciences, University of Memphis in August 2013 as a Distinguished University Professor and Chair. Prior to that she was Commonwealth Professor of Mathematics, an endowed chair, at the University of Virginia, where she served as a Full Professor since 1987. In May 2013 she was listed by StatStats.org among the "Top 26 Women Professors in Virginia". In October 2012 she was a recipient of the Presidential Professorship in Sciences, with a ceremony held at the Presidential Palace in Warsaw, Poland. In May 2011 she was awarded the SIAM W.T. Idalia Reid Prize for contributions to Differential Equations and Control Theory. In 2006 she received the "Technical Achievement Award by the International Congress in Nonlinear Analysis and Applications in Budapest, Hungary. Still in 2006 she was appointed to the International Advisory Board of the Polish Academy of Sciences. Since 2004 she has been a IEEE Fellow with the citation: "For contributions to Boundary Control Systems". She is in the ISI List of Highly Cited Researchers since its inception in 2000. In 1999 she was the Principal Lecturer of the CMBS-NSF Conference entitled "Mathematical Control Theory of Coupled PDEs" (10 lectures), held at the University of Nebraska.

She received her PhD in Mathematics in 1975 from the University of Warsaw. She became Professor of Mathematics at the University of Florida in 1984 and in 1987 she joined the University of Virginia. She has been Principal Lecturer all over the world, delivering plenary talks and series of advanced lectures including recent plenary talk at 2011 SIAM Meeting in Baltimore, MD; Postdoctoral courses on "Recent Advances in PDE's" at the University of Milan, Italy, 2013; at Koc University,

Istanbul, Turkey, 2012; at SISSA, Trieste, Italy, 2012; at the University of Warsaw (under the award of a Honorary European Union Visiting Professorship), in 2010; several times at Scuola Normale Superiore, Pisa, Italy, during 2000-2010; at the University of Jyvaskula, Finland, 1993; etc. Moreover she was a Distinguished Visiting Scholar Speaker at Texas Tech University, 2000; and a Principal Lecturer at the 1997 J.Barrett Memorial Lectures at the University of Tennessee, Knoxville.



Dr Lasiecka's research interests include partial differential equations and related stability and control theory and dynamical systems. She has published 8 research monographs and over 300 research papers. She has supervised over 24 PhD theses. She serves in numerous editorial boards including Editor in-Chief of Applied Mathematics and Optimization, Springer Verlag. From 2003 to 2009 she was the Chair of Technical Committee 7 (Modeling and Optimization) of IFIP, from which she received the Silver Core Award in 1989. Her research work has been continuously supported by both the National Science Foundation and also by the AFOSR and the ARO.