

Nonlinear dynamics: A Journey through experiments

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Abstract

Dynamics of a variety of mechanical and structural systems need consideration of nonlinearities. In this talk, a collection of experiments conducted to further our understanding of nonlinear dynamics will be presented. The experimental findings will be explained with the help of analytical and numerical studies. Grazing dynamics, slow-scale and fast-scale decompositions, delay dynamics, and buckling influenced oscillations will be considered to illustrate the ubiquitous presence of nonlinearity influenced phenomena across length scales. Relevance of the work to different systems in practice ranging from space structures to AFM systems to drilling systems will be discussed.

Biography

Dr. Balachandran received his B. Tech (Naval Architecture) from the Indian Institute of Technology, Madras, India, M.S. (Aerospace Engineering) from Virginia Tech, Blacksburg, VA and Ph.D. (Engineering Mechanics) from Virginia Tech. Currently, he is a Minta Martin Professor of Engineering at the University of Maryland, where he has been since 1993. His research interests include nonlinear phenomena, dynamics and vibrations, and control. The publications that he has authored/co-authored include over ninety journal publications, a Wiley textbook entitled "Applied Nonlinear Dynamics: Analytical, Computational, and Experimental Methods" (1995, 2006), a Thomson/Cengage textbook entitled "Vibrations" (2004, 2009), and a co-edited Springer book entitled "Delay Differential Equations: Recent Advances and New Directions" (2009). He holds four U.S. patents and one Japan patent, three related to fiber optic sensors and two related to atomic force microscopy. He serves on the editorial boards of the *International Journal of Dynamics and Control* and *Acta Mechanica Sinica*, is a Contributing Editor of the *International Journal of Non-Linear Mechanics*, and serves as an Associate Editor of *Nonlinear Theory and its Applications*, IEICE. He started as the Editor of the *ASME Journal of Computational and Nonlinear Dynamics* in January 2016. He is a Fellow of ASME and AIAA, a senior member of IEEE, and a member of ASA, AAM, and SPIE.

