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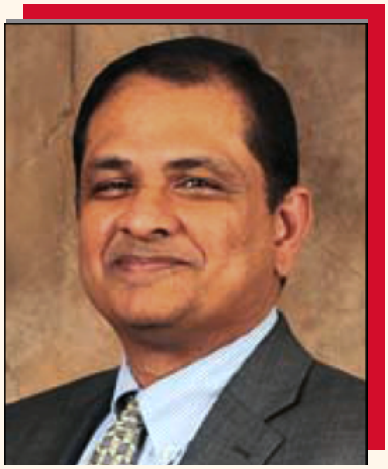
Desirable Dynamics with Noise



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ABSTRACT:

Nonlinearity influenced dynamics occur in a variety of mechanical and structural systems. In many of these system operations, noise is often viewed as being undesirable. However, the interplay between noise and nonlinearity in a system can result in significant response changes that can be beneficial to a system's performance. In this spirit, the work carried out to further our understanding on the constructive use of noise in a nonlinear system to realize noise-enhanced responses, noise-enabled stabilization, and noise-assisted response steering will be discussed. Representative physical systems that will be considered include coupled oscillator arrays at the micro-scale and macro-scale, flexible rotor systems, and pendulum systems. The findings of these studies are expected to be relevant to a variety of different nonlinear, mechanical and structural systems. Some thoughts on future directions in the realm of applied nonlinear dynamics will be presented to close the talk.

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. He is also a faculty member of the Applied Mathematics and Scientific Computation Program. His research interests include nonlinear phenomena, dynamics and vibrations, and control. The publications that he has authored/co-authored include nearly eighty 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, Deputy Editor of the AIAA Journal, and as an Associate Editor of Journal of Vibration and Control, Meccanica, and Nonlinear Theory and its Applications, IEICE. He recently completed his term as an Associate Editor of the ASME Journal of Computational and Nonlinear Dynamics. He is a Fellow of ASME and AIAA, a senior member of IEEE, and a member of ASA, AAM, and SPIE.