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ABSTRACT TITLE: Characterization of bending EAP beams

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PRESENTATION - Oral Presentation

ABSTRACT

Electroactive polymers (EAP) are attractive actuation materials because of their large deformation, flexibility, and lightweight. The large deformation, especially in the bending mode, poses a challenge to the material and actuator characterization due to the geometric nonlinearity that is involved with the characterization. A CCD camera system was constructed to record the curved shapes of bending during the activation of EAP films and image-processing software was developed to digitize the bending curves. A computer program was developed to solve the inverse problem of cantilever EAP beams with tip position limiter. Using the developed program and acquired curves with and without tip position limiter as well as the corresponding tip force, the EAP material properties of voltage-strain sensitivity and Young's modulus were determined. The experimental setup and the principles of the computer program that were developed will be described and discussed in this paper.

KEYWORDS: Electroactive polymer, EAP characterization, Large deformation, Bending actuator.

BRIEF BIOGRAPHY: Dr. Xiaoqi Bao is a Member Technical Staff at the NDE and Advanced Actuators (NDEAA) team of the Jet Propulsion Laboratory. He joined JPL in May 1997 after serving for about ten years as a Research Associate at Pennsylvania State University. He received his Ph. D., Physics, in 1985 and M. Sc., Physics, in 1982 from the Chinese Academy of Sciences, Beijing, China. In 1986, Dr. Bao was a Visiting Scientist at the Dept. of Electrical Engineering of Toyama University, Japan. He has research experience in piezoelectric materials, composites, and actuators, ultrasonic NDE, SAW sensors, active vibration and sound control, as well as intelligent materials/structures. He has published more than 30 papers in related research areas.