The Department of Mechanical Engineering/College of Engineering and Applied Sciences Stony Brook University

TOPICS IN MECHANICAL ENGINEERING
THE FRANK W. OTTO DISTINGUISHED LECTURE SERIES

Michael Y. Y. Hung, John F Doge Professor Emeritus
Oakland University, Rochester, MI

Lecture Title: Shearography and Laser-speckle 3D Vision from Academic Research to Real-World Applications

Friday, January 19 at 11:00 AM, Light Engineering Room 173

Abstract

This lecture reviews two examples of successful development from academic research to real-world applications:

1. Shearography is an interferometric technique for full-field and non-contact measurement of object deformation. It was invented by the speaker to overcome several limitations of holography (Note that holography was invented by Prof Dennis Gabor and he was awarded a Nobel Prize in Physics for the invention.) by eliminating the requirement of a reference beam. The technique enjoys the advantages of simplified and robust setup, reduced laser coherence length requirement, and less demanding in environmental stability. Consequently, it is employable in industrial settings and has received wide industrial acceptance, particularly for NDT. Being a full-field and noncontact method, shearography permits in-situ whole-field and real-time visualization and quantification of subsurface defects. Currently the rubber industry routinely uses shearography for evaluating tire quality, and the aerospace industry adopts it for nondestructive inspection of aircraft structures. In particular, FAA had endorsed the technique for inspecting aircraft tires. Since the adoption, aircraft accidents due to tire failures have been virtually eliminated.
2. Orbbec 3D camera is another example of successful development of academic research to real-world applications. The camera allows real-time measurement of 3D shape and motion of an object. It has many real-world applications. The company led by Dr. Howard Huang presently focuses on applications in 3D remote sensing and control, in particular, related to 3D gaming in the communication and entertainment industry.

Biography

Michael Hung received his PhD in theoretical and applied mechanics from the University of Illinois, and has recently retired after forty years of academic services. Presently he is John F. Dodge Professor Emeritus at Oakland University. In 2001, he joined City University of Hong Kong as Chair professor and Head of the Manufacturing Engineering and Engineering Management where he extended shearography to NDT of building structures. Prof Hung has multi-disciplinary research experiences including: nondestructive testing, experimental stress analysis, design optimization, noise and vibration, composite materials, and optical metrology. Besides numerous publications, he had conducted many industrial projects. He is a pioneer in industrial applications of holography and is the inventor of shearography that is widely adopted for nondestructive inspection of aircraft structures, particularly, aircraft tires. He had served as consultant to numerous industrial corporation and government agencies. Prof Hung received numerous professions awards including the prestigious BJ Lazan award for “outstanding contribution in experimental mechanics”, Outstanding Faculty Award of Michigan College Board, OU Research Excellence Award, Dodge Chair, etc. Prof Hung is a fellow of SEM (Society for Experimental Mechanics) and a Fellow of SPIE (The International Optical Society).

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