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

Mechanical Engineering Distinguished Lecture

Dr. Leon Keer
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Lecture Title: The Evolution of Contact Mechanics
Friday, March 14, 2008, 11:00 AM, Room 301 Engineering Building

Abstract
The theory of Hertz was developed in 1882 to solve the specific problem of frictionless, elliptical contact between two bodies the Hertz assumptions allowed a solution to be realized in closed form for both the contact stresses and interior stress field. The theory became so popular that contacts satisfying these assumptions were called Hertzian. Real surfaces, however, consist of many asperities. For two rough surfaces their area of contact is usually smaller than that predicted by Hertz because of the asperity contacts. Due to the needs of industry and the development of high-speed computers, recent research in contact mechanics has been focused on surfaces with real, engineered roughness, surfaces with hard protective coatings, misalignment and other types of contacts not in the Hertzian category. In addition the inelastic behavior of contacts can also be an issue. This talk will review some of the analytical and computational techniques used to develop realistic and computationally efficient tools for solving such problems. The focus will be on four general areas of contact as follows: Hertzian contact and analytical solutions; Non-Hertzian Contact—Issues of Geometry; Frictional Contact; and Problems Requiring Computational Methods. How the mathematical framework has evolved from developing analytical solutions to ones that are solved from a purely computational approach will be described by examples. These latter approaches are made necessary by the industrial focus on surface phenomena, and the requirement of increased component life with more stringent load requirements. The extension to ever-smaller length scales will be mentioned briefly.

Biography
Leon M. Keer was educated at the California Institute of Technology and the University of Minnesota. He has been a member of the Technical Staff, Hughes Aircraft Company and has consulted for several companies. He has held positions at Columbia University (Preceptor), and since 1964, at Northwestern University, where he is currently Walter P. Murphy Professor. He is a former North Atlantic Treaty Organization Fellow, a John Simon Guggenheim Memorial Foundation Fellow and a Japan Society for the Promotion of Science Fellow. In 1997 he was elected to the National Academy of Engineering and in 2003 received the Daniel C. Drucker Medal of ASME. He conducts research in the area of solid mechanics and investigates specialized topics of fracture and fatigue, surface mechanics and tribology, among others.

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