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aerospace engineering & engineering mechanics

GRADUATE SEMINAR

SHOCK COMPRESSION OF SOLIDS

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California Institute of Technology

Date: February 7, 2003
Time: 3:00 – 4:00
Place: 755 Baldwin

ABSTRACT

Upon subjecting to fast, large amplitude loads, solid substances are forced into unusual and distinctive conditions such that their inertial properties result in the propagation of shock waves within the body. Thus, many mechanical, metallurgical, electrical, optical and other phenomena, which are not observed under usual loading conditions, can occur in materials being compressed by high-pressure shock waves. In this talk, some shock induced mechanical phenomena such as elastic-plastic structured waves, phase transformation, shock-induced spallation, shock viscosity in metals are briefly addressed first. Due to the intrinsic heterogeneity of composites, shock wave propagation in composites is more complicated than that in homogeneous metals. In the second part of this talk, the effect of interface scattering on the shock wave propagation in layered composites is discussed. Then, as an application of high power laser in the study of shock compression solids, laser-induced spallation phenomenon in metals is also included. In addition, experimental techniques for the study of shock compression solids and high strain rate deformation of materials are briefly introduced.

BIOGRAPHICAL SKETCH

Shiming Zhuang received his BS degree in Applied Physics from Chongqing University (China) in 1984, MS in Applied Mechanics from the Graduate School, China Academy of Engineering Physics in 1989, and Ph.D. in Aeronautics from California Institute of Technology (Caltech) in 2001. He worked as an engineer in the area of combustion/detonation experiments in Southwest Institute of Fluid Physics (SIFP) for two years till 1986 when he began his graduate study toward MS degree. After receiving his MS degree in 1989, he went back to SIFP conducting research on the thermal and mechanical effects of laser interaction with solids and structures. In 1993, he became a research fellow of SIFP. He went to Caltech in 1995 and worked as a Visiting Associate in Aeronautics for one year. In 1996, he decided to study at Caltech toward Ph.D. degree. Currently, Dr Zhuang is a Research Scientist in Aeronautics, Caltech.

Dr. Zhuang's thesis research was on stress wave propagation in periodically layered composites and awarded for the William F. Ballhaus Prize, the outstanding doctoral dissertation in Aeronautics, Caltech. In 1991, Dr Zhuang received the Outstanding Investigator Award from National Science and Technology Committee of China, and included in Marquis Who's Who in the World in 1995. He reviewed papers for several international journals and currently is a member of the American Physical Society.

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