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## Impact Techniques for the Study of Physical Properties of Solids Under Shock-Wave Loading<sup>1</sup>

**R. A. GRAHAM**

Member, Technical Staff,  
Sandia Laboratory,  
Albuquerque, N. M.  
Assoc. Mem. ASME.

Measurements of various physical properties of solids while they are subjected to shock-wave loading from precisely aligned projectile impacts are described in order to illustrate the unique features and capabilities of the impact experiment. Results and experimental techniques are shown for the measurements of: (1) The piezoelectric coefficient of X-cut quartz from 2.6 to 25 kbar, (2) the permittivity change of 60-deg orientation sapphire from 20 to 100 kbar, (3) the resistance of [111] germanium which gives resistivity data in the elastic range and permits identification of the solid-solid phase transition at about 120 kbar, and (4) the compressibility of ferromagnetic fcc 30%Ni-70%Fe from 4 to 50 kbar which permits identification of the pressure-induced Curie point transition and a complete thermodynamic description of the transition.

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R. A. GRAHAM

Member, Technical Staff,  
Applied Mechanics  
Department, IBM  
Arden House, Arden

Measurements of various physical properties of solids which are subjected to shock-wave loading have been reported in the literature. This paper describes the impact loading and compression of the impact apparatus used in the present study. The apparatus consists of a gas gun, a driver, a sample, and a target. The gas gun is a modified 12-gauge shotgun which is fired from a distance of 200 ft. The driver is a 1/2-in. diameter lead slug which is fired from the gas gun. The sample is a 1/2-in. diameter lead slug which is fired from the gas gun. The target is a 1/2-in. diameter lead slug which is fired from the gas gun. The impact apparatus is used to study the physical properties of solids under shock-wave loading.

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