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66-WA/PT-2

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Impact Techniques for the Study of Physical Properties of Solids Under Shock-Wave Loading[1]

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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.

[1]**This work was supported by the United States Atomic Energy Commission.**

Contributed by the Research Committee on Pressure Technology for presentation at the Winter Annual Meeting and Energy Systems Exposition, New York, N. Y., November 27-December 1, 1966, of The American Society of Mechanical Engineers. Manuscript received at ASME Headquarters, August 1, 1966.

Copies will be available until September 1, 1967.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, UNITED ENGINEERING CENTER, 345 EAST 47th STREET, NEW YORK, N.Y. 10017