Bull. Amer. Phys. Soc., 15, 1626

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of impedance of the material bounding the composite with that of the equivalent impedance of the composite. The numerical calculations are in excellent agreement with the experimental results.

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EF 8. The Effect of Shock Compression on the Electrical Resistivity of Three Polymers.*† A. R. CHAMPION, Sandia Labs.--The effect of uniaxial shock compression on electrical resistivity was investigated for polytetrafluoroethylene (PTFE) and high and low density polyethylene (HDPE and LDPE) for shock stresses ranging from a few tens of kilobars to 300 kbar for LDPE and HDPE and to 550 kbar for PTFE. Over these pressure ranges, the resistivities measured at shock transit time were found to be 10 to 14 orders below the resistivities at atmospheric pressure. For flyer plate impact experiments at a given shock stress the measured resistivities were dependent on sample thickness. For all three polymers, the resistivities of samples 0.6 and 1.3 mm thick remained outside the range of the measuring circuitry ($\rho > 10^9 \Omega$cm) while for 2.5 and 5.0 mm thick samples the resistivity decreased with increasing thickness. This thickness dependence suggests that the resistivity varies with time behind the shock front. Upon unloading from shock states above 200 kbar for LDPE and HDPE and 350 kbar for PTFE, further decreases in resistivity of 2 to 3 orders of magnitude were observed. This behavior is consistent with melting of the samples during unloading.

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†Submitted by L. C. Bartel.

EF 9. Determination of the Grueneisen Parameter of a Composite Using Laser Generated Stress Waves* C. MARK PERCIVAL, Sandia Labs. - The Grueneisen parameter of an isotropic composite material consisting of 20 micron aluminum particles dispersed in a polymethyl methacrolate (PMMA) matrix has been determined from measurements of laser generated stress pulses. Pressure measurements were made using a quartz gauge in the shorted guard ring configuration. The loading was varied from 2.9 to 40. volume percent aluminum. The energy penetration depth for various loadings were calculated and checked with spectrophotometer measurements. The experimental results were corrected for the effects of finite energy deposition time and impedance mismatch between the sample and the quartz gauge. The phenomenon was assumed to be adiabatic and the experimentally determined Grueneisen parameter of the composite showed good agreement to that predicted

by the elastic theory of Budiansky[1].

*Work supported by the U. S. Atomic Energy Commission.
[1]B. Budiansky, J. Composite Materials 4, 286 (1970).

EF 10. Shock Wave Study of Liquid Chloroform, Cyclohexane, and Hexane.* R. D. DICK and R. H. WARNES, Los Alamos Scientific Laboratory. -- The Hugoniot curves for chloroform, cyclohexane, and hexane at 23°C have been obtained by using high-explosive and impedance match techniques. The shock velocities in the standard material and in the liquids were determined from electrical contactor data. It was observed that chloroform undergoes a transition at about 250 kbar in contrast to carbon tetrachloride.[1] No transition was observed for either cyclohexane or hexane over the range of the experimental data. This result indicates that the molecular differences between these materials and benzene[1] are sufficient to suppress a transition.

*Work performed under the auspices of the U. S. Atomic Energy Commission.
[1]R. D. Dick, J. Chem. Phys. 52, 6021 (1970)

EF 11. Characterization of a Reconstituted Sheet Explosive.* R.P.MAY,† Sandia Labs.--Pressure-time histories of DuPont EL-506D and a 57 mil reconstituted product of this sheet explosive were investigated to obtain impulse characteristics. Specific impulse was found by measuring pressure as a function of time and also by measuring the velocity imparted to a known mass. Commercial EL-506D sheet explosive delivered a specific impulse of 731 taps/mil and 57 mil thick reconstituted explosive delivered 526 taps/mil. Peak pressure at 1.4 mm depth in epoxy was 72 kbar for EL-506D and 52 kbar for the reconstituted explosive; similarly, detonation velocity decreased from 7.2 to 6.6 mm/μsec. Pressure histories were recorded from 1.0 to 6.4 mm depth in epoxy. Peak pressure decreased linearly with depth and the pulse duration increased. This response agreed with calculations using a one-dimensional finite difference type code (WONDY III). Code input was the epoxy equation of state, and estimation of peak pressure at the epoxy-explosive interface, and the impulse data. Pressure in copper, aluminum, and Plexiglas induced by 100 mm pads of the reconstituted explosive gave the explosive reflection characteristic.

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†Submitted by C. D. Lundergan.