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A New Diagnostic for Shock Experiments: Pulse Correlation Reflectometry TERRY SALYER, Los Alamos National Laboratory — Based on the conceptually simple principle of time domain reflectometry, the pulse correlation reflectometry technique allows for the determination of shock position as a function of time along a diagnostic cable. Once the electrical pulse speed of the cable is accurately known (via calibration), the current shock position may be determined by measuring the two-way transit time of an interrogation pulse reflected off the electrical short created by the crushed cable at the shock position. Due to electrical pulse dispersion within the cable, a pulse correlation analysis method is required to achieve the positional accuracy required for small-scale shock experiments. To further increase the positional accuracy, a method of multiplexing several pulses within the cable allows for more frequent interrogation of the dynamic shock front. With a high frequency pulser and a high bandwidth digitizer, the new technique can acquire far more data than typical fiducial pins, effectively providing a near continuous shock position measurement. Initial experiments along explosively driven surfaces indicate excellent agreement with pin and streak camera data, while yielding a several order of magnitude increase in data with an order of magnitude reduction in fielding time, complexity, and cost.

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