UNDERSTANDING DYNAMIC AND STATIC PRESSURE BY MEANS OF PARTICLE AND SHOCK VELOCITY STUDY IN AN AIR BLAST

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Particle velocity studies are an effective way to determine pressures via the Rakine-Hungiont relationship. A study of particle and shock velocity took place at the Large Blast Thermal Simulator (LBTS) on White Sands Missile Range (WSMR), New Mexico in September 2009. A ten foot PVC pole was suspended from the overhead. The pole was dropped approximately one half second before the blast from the simulator was released. High speed cameras were used to capture both the pole and the shock position. Time and position data were then used to find velocity of the shock wave and pole. The shock wave velocity was used to determine static pressure. The pole did not represent the particle velocity directly. The velocity and acceleration of the pole were used to find the corresponding particle velocity. Using a Rakine-Hungiont relationship the dynamic pressure was calculated from the particle velocity and compared to the gage data. Dynamic pressure between the gage and the pole methods yield a percent error just less than 20%. The static pressure found via the speed of the shock wave and gage measurement had a percent error of approximately 11%.