NOVEL BLAST TIME OF ARRIVAL GAUGE USING PHOTONIC DOPPLER VELOCIMETRY

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This paper describes a novel time of arrival (TOA) method using a photonic Doppler velocimeter (PDV). The experimental arrangement consisted of a cylindrical explosive charge and a nearby plastic tube. The tube face was covered with a layer of aluminum film (foil) and subsequent layers of polyethylene film (Saran™ wrap) that were placed inside of the tube. The order of operations is as follows. First, one end of the explosive charge was detonated. Second, the detonation wave propagated through the charge which resulted in a blast wave transmitted into the air. Third, the blast wave traveled through the air and encountered the tube face. Fourth, the blast wave imparted motion to the aluminum foil tube face which was measured by the PDV. Finally, the aluminum foil was ruptured and the blast wave encountered the subsequent layers of polyethylene. The motion of each layer was measured by the PDV since the polyethylene layer were semi-reflective. Although, the signals were weak, time of arrivals were obtained. The experiment will be simulated with the CTH hydrocode and a configuration where the layers are put in free-standing fixtures will be explored.