Plotting a deceleration curve for the explosive products of explosive HMX-based mixture using PDV technique

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Experimental data on shock compression of solids is a primary source of knowledge used to build equations of state; it determines the relationship between pressure, density, and energy, i.e. the Hugoniot. An important task is to obtain the deceleration curve of the explosive products (EP), a function relating pressure and particle velocity in expansion and compression of explosive products. Knowledge of this curve enables determining the state parameters at the Chapman-Jouguet point. It can also serve as the starting point for deriving the EP equation of state. In this work, a deceleration curve for the explosive products of an explosive HMX-based mixture was obtained. The experimental setup was selected to be conventional, wuth initiation of a plane detonation wave in the explosive by a flyer plate, yielding an initial pressure (37 GPa) close to, but lower than, the Chapman-Jouguet point. At that, both the wave velocity anf the free surface velocity at the entrance and exit of the second barrier layer were recorded in sufficiently thick two-layer barrier samples with different shock impedances. The first barrier layer was required for attenuation of the chemical spike. Two-layer samples made of materials with different dynamic stiffnesses were as barriers. The process of the plate movement was recorded using a non-perturbing PDV technique that performed measurements, continuous over time.