EXPERIMENTAL CONTRIBUTION TO THE STUDY OF DYNAMIC BEHAVIOUR OF ROCK MEDIA

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Numerical simulation of underground stress wave propagation includes mathematical modeling of geological materials.
This paper describes the concept and data for a model entirely drawn from experimental work. A specific geological material was chosen for the tests: Gramat compact limestone. However, the unfolded methods remain sound for any other kind of compact media.

The behavior of rock must be analyzed over a range extending from hydrodynamic fluid behavior at extremely high pressure regions in the neighborhood of the burst point, through plastic solid state and finally to elastic behavior.

So, the stress range of the shock waves induced in the rock samples will have to be as large as possible: the realized range was 2 kb - 650 kb.
On other hand, the plane one dimensional shock waves induced in the samples is a good approximation of the real flow at the scale of the rock cells involved in the codes.

The experimental data obtained, reproduce in the real behavior of rock because all the elements of the stress tensor are measured with piezoresistive gages. This way of measurement is the only possibility in the dynamic plastic range where the stress-strain relationship is unknown, that is to say where strain gages are of no use.

We have found a special interest studying dynamic plasticity, comparatively to elastic and hydrodynamic behaviors, because shock wave wastage, pore collapse and plasticity are dependent phenomena.