O14-2 HAZARD ASSESSMENT AND SEISMIC RISK REDUCTION IN ROCK REMOVAL BLASTS AT ARNOTA (ROMANIA) LIMESTONE QUARRY

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A research was conducted to ensure antiseismic protection of the building structure and architectonic elements and murals at Arnota Monastery, a historical and religious monument.

Antiseismic protection was based on hazard assessment and seismic risk reduction in the circumstances of rock removal blasts at a limestone quarry near the monastery.

To ensure antiseismic protection of various structures (by preventing potential deterioration) and minimize damage claims, especially in heavily populated areas, mining businesses can cut seismic oscillations caused by rock removal blasts down to admitted values. To this end, various safety limits have been set for the maximum displacement and oscillation frequency of a ground particle. To conduct such research in the case of Arnota limestone mine, observation data collected in the period 1967-1979 were used.

The instrumental seismic data resulting from the Arnota research consisted of seismograms on which the three seismic movement components had been recorded.

A processing of these data supplied the main dynamic parameters (displacements, velocities, frequencies, etc.) of the blast-caused seismic oscillations arising in the ground. The oscillation frequencies of a ground particle were calculated along the: transverse (ν_T), vertical (ν_V) and radial (ν_R) directions; the horizontal component (ν_H), $\nu_H = (\nu_T^2+\nu_R^2)^{1/2}$ and the total resultant (ν_{Tot}), $\nu_{Tot} = (\nu_T^2+ +\nu_V^2+\nu_R^2)^{1/2}$. The “total resultant” specification is necessary, because H is also a resultant which yet only includes the two horizontal components (Table 1).

The charts in Figure 1 show the oscillation frequencies (ν) of a ground particle in terms of the reduced distances (RD) for every component and resultant of the seismic movement, and for the total resultant.

Table 1.

Motion component	Equation used: lg *(v)* = *K* -*M* lg *(D.R.)*		Correlation coefficient *(R)*	Standard deviation *(s)*
	Parameter *(K)*	Parameter *(M)*		
Transverse	1,499	0,922	-0,712	0,070
Vertical	1,294	0,971	-0,789	0,066
Radial	3,010	1,432	-0,819	0,103
Horizontal	3,179	1,375	-0,869	0,072
Total resultant	3,412	1,393	-0,912	0,047

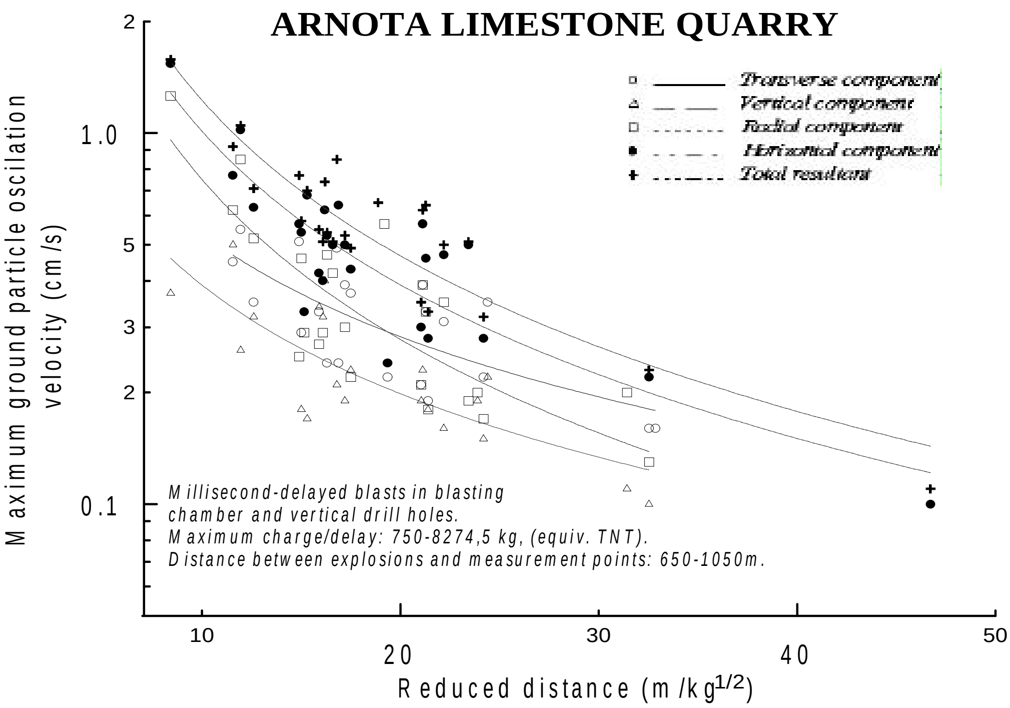

Fig. 1. Maximum oscillation velocity of a ground particle in terms of reduced distance (*RD*) for three components: transverse (v_T), vertical (v_T), and radial (v_R), and two resultants: horizontal (v_H) and total (v_{tot})