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A Case Study of Control of Blast-Induced Ground Vibration on Adjacent Structures

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Abstract : In recent decades, the study and control of the destructive effects of explosive vibration in construction projects has received more attention, and several experimental equations in the field of vibration prediction as well as allowable vibration limit for various structures are presented. Researchers have developed a number of experimental equations to estimate the peak particle velocity (PPV), in which the experimental constants must be obtained at the site of the explosion by fitting the data from experimental explosions. In this study, the most important of these equations was evaluated for strong massive conglomerates around Dez Dam by collecting data on explosions, including 30 particle velocities, 27 displacements, 27 vibration frequencies and 27 acceleration of earth vibration at different distances; they were recorded in the form of two types of detonation systems, NUNEL and electric. Analysis showed that the data from the explosion had the best correlation with the cube root of the explosive, R2=0.8636, but overall the correlation coefficients are not much different. To estimate the vibration in this project, data regression was performed in the other formats, which resulted in the presentation of new equation with R2=0.904 correlation coefficient. Finally according to the importance of the studied structures in order to ensure maximum non damage to adjacent structures for each diagram, a range of application was defined so that for distances 0 to 70 meters from blast site, exponent n=0.33 and for distances more than 70 m, n =0.66 was suggested.

Keywords : blasting, blast-induced vibration, empirical equations, PPV, tunnel
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