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"BT Code and SVM Feature Based CBIR"

International Journal of Advanced Studies of Scientific Research, Volume 3 Issue 8, 2018

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In content-based image retrieval (CBIR) implies the mission of a picture proceeds at the genuine substance material of picture to a positive volume to its metadata. The CBIR System has used for the evacuate the highlights, ordering person's highlights by improper development and competently given a reaction to the client's vulnerability. To supply the sensible reaction to the customer question, CBIR gave some keep running of work. A novel plan is arranged in this paper for shading picture ordering by building up the simplicity of the SVM framework. A novel strategy is proposed in this paper for shading picture ordering by misuse for it simple of the SVM framework. This component Extraction was viewed as the paired order issue and SVM was utilized for the arrangement this issue. It is assumed that to accomplish the extraction at the quick and furthermore to make it so versatile that it can similarly change with the photos of significant size. The essential point of this paper is to remain for the noteworthiness of keeping up vector machine in the efficient recovery of a picture in this SVM is used as the classifier which is playing out the errand of characterization the picture and this procedure of grouping are given to all the picture which are separated after the feature extraction process.

"Heuristic Knowledge Discovery for Medical Data Using Cultural Algorithm"

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Numerical modelling based assessment of ground vibrations

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Abstract –Numerical simulation was employed to estimate the dynamic behavior of the canal slope under blasting load based on the blast vibration field test of Yanakandla Mine, Kurnool District of Andhra Pradesh. Blast vibrations were monitored at different distances and based on the data obtained a regression curve was generated. The study consisted of slope stability analysis of the canal near the mine using the Distinct Element Modelling technique in 3DEC software. To simulate the explosion, a simplified triangular blasting load was adopted. The velocity and displacement fields of the slope under blasting were analyzed and the PPV values obtained from numerical modelling showed close approximation to the field investigation results. As a parametric study, a vertical joint was incorporated into the model and analysis was undertaken to determine the influence of joint in the rock mass.

Keywords - numerical simulation; 3DEC; distinct element modelling; triangular blasting load.

I. INTRODUCTION

Slope stability analysis is becoming a major concern, as open cast mining contribute maximum to the total production in the mining industry. Hence it is very crucial to evaluate the various potential failure mechanisms occurring in the slope and to take economically feasible steps to reduce, remove and mitigate the risk associated with slope stability. In order to tackle the problems related to stability numerical modelling software are needed. Yang et al. [1] conducted a study of the dynamic behavior of road high cutting rock slope under the influence of blasting for excavation and numerical simulation by FLAC-3D was employed and the result showed that the particle vibration velocity simulated which was consistent with that by field test. Singh et al. [2] carried out a study on the effect of blast vibration on damage of surface structures and their study was focused on the determination of safe levels of ground vibration for residential structures and other buildings in the mining area. In an article by Guo-yuan et al. [3] on numerical simulation for the influence of excavation and blasting vibration on the stability of mined out area, dynamic analysis steps and general flow of fast Lagrangian analysis of continua in FLAC 3D were discussed. Griffiths et al. [4] had done a study on the topic slope stability analysis by finite elements and described several examples of finite element stability analysis with comparison against other stability analysis methods. From the study it was found that the FE method in conjunction with an elastic- perfectly plastic stress-strain method has been shown to be a reliable and robust method for assessing the factor of safety of slopes. So this method can effectively use as an alternative to traditional limit equilibrium methods. Singh [5] conducted a study on blast vibration damage to underground coal mines from adjacent open-pit blasting and investigated seven coal mines in India . Monitoring of strata behaviour was carried out before and after the blasts by installing the strata monitoring instruments in the roof and pillar and the threshold value of vibration for the safety of underground workings is recommended based on the RMR of the roof rock. Zou et al. [6] conducted a study on the topic FLAC3D-based Improvement of the Strength Reduction Method's Slope Stability, discussed the method of separate reduction of shear strength parameters such as friction angle and cohesion after obtaining potential slide surface through the high value zone of horizontal displacement, and thus realizes the dual safety coefficient slope stability evaluation method. Li et al. [7] has done study on blasting vibration control of creep mass high slope focusing on creep mass high slope of hydropower station and control of several damages to this structure due to blast vibration. On the basis of decay experience formula and damage standards due to blasting, the safety controlled parameters of cast in situ concrete of the creep mass high slope are derived. Sastry et al. [8] conducted a study on the topic blast induced response of a tunnel in the presence of a two storied structure. In this study, they have taken three velocity time histories of different PPV were applied at three different boundaries of the model and studied the effect of varying input PPV's (frequencies) on the stability of building and tunnel effect of applying dynamic vertical wave at different locations of the model. Results of study indicated that peak velocity response occurs in the beams of the top floor and greater displacement was occurred at the top of the building and also concluded that irrespective of location of application of input waves, maximum concentration of stress occurred at the tunnel sides. Kahriman [9] conducted a study on analysis of parameters of ground vibration produced from bench blasting at a limestone quarry to predict peak particle velocity level at a limestone quarry located in Istanbul, Turkey and at the end of statistical evaluations, an empirical relationship with good correlation was established between peak particle velocity and scale distance for this site. Holmberg et al. [10] had done a study on case examples of blasting damage and its influence on slope stability and introduced simulated blast damage into samples before testing the shear strength to show the blasting damage influence on the slope stability. A mathematical model was also described to optimise the blast design for a specified damage zone in the rock mass. Seismic cross hole measurements were performed before and after the blast to monitor how the amplitudes and the transmission times changed after the blast and the results achieved from these holes showed that both the P wave velocity and the maximum amplitude were reduced after the blast.

II. INVESTIGATIONS AND DETAILS

A. Field investigations

About eight (08) blasts were conducted to determine the influence of ground vibration on the canal slope stability and a study was taken up to assess the impact of blasting operation on the canal, carried out in the mine. General location and accessibility map of the lease area is shown in Figure 1.

FIGURE I. GENERAL LOCATION AND ACCESSIBILITY MAP OF THE LEASE AREA

B. Area of study

Blast vibration studies were carried out in Yanakandla Mine at Yanakandla Village in Banaganapalli Mandal, Kurnool District of Andra Pradesh. The problem of concern in the present case was the ground vibration that may have effect on the nearby Canal. The excavated irrigation GNSS canal traversing along deposit periphery towards north-west side of mine. It is proposed by the mine management to advance the benches to 50m towards the canal side, simultaneously maintaining the safety of canal. Statistics of Yanakandla limestone mine as on 31.03.2015 is shown in figure 2. Figure 3 shows the GNSS canal located near the mine lease area.

FIGURE II. STATISTICS OF YANAKANDLA LIMESTONE MINE AS ON 31.03.2015

FIGURE III. GNSS CANAL LOCATED NEAR THE MINE LEASE AREA

To assess the impact of blasting operations, eight (08) production scale blasts conducted at different locations in Yanakandla Limestone Mine were studied. Blastholes of 115mm diameter were drilled using wagon drills. Depth of blastholes was varying from 6 to 7m in different blast rounds. Each blasthole was charged with ANFO mixed with husk as column charge. Slurry explosive was used as Primer charge, with cartridges of 2.78kg each, making the explosive charge per hole to 14.35kg to 39.06kg. Exel Dueldet shock tube system of initiation was used, simultaneously providing the in-hole initiation and surface delay. The pattern of explosive column and stemming in blasthole was changed from blast to blast. Figure 4 shows the general view of the mine.

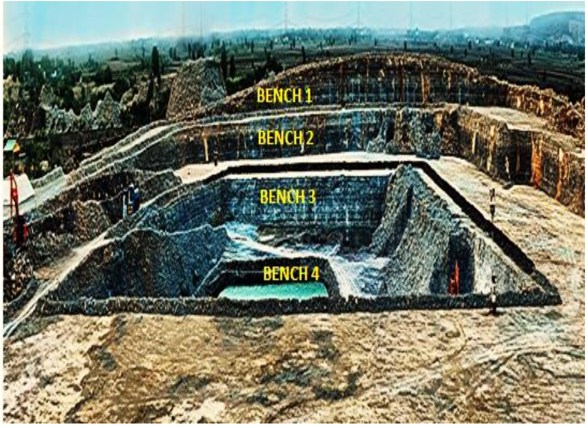

FIGURE IV. GENERAL VIEW OF THE MINE

Locations of different blasts studied in the Yanakandla limestone mine are shown in Figure 5. Layouts of all the blasts studied are given in figure. All the eight (08) production blast vibrations were recorded using minimates. B- 1,2,3,4,5,6,7,8 indicates respective blast locations. Figure 5 shows the location of blast rounds studied.

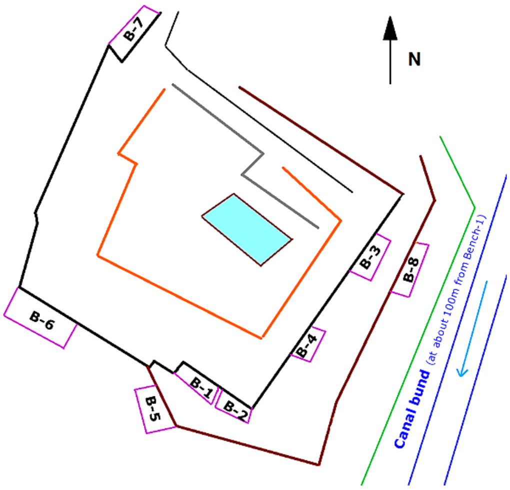

FIGURE V. LOCATIONS OF BLAST ROUNDS STUDIED

C. *Monitoring vibrations*

Blast vibrations are monitored using the instrument Instantel Minimate Plus. The vibrations were captured by means of geophones kept at different distances i.e. 30, 40, 50, 60, 70, 80, 90 and 100m. Ground vibrations captured by the sensors in geophones were downloaded into a computer using external accessories and these data were analysed using Blastware software. Hence peak particle velocity, frequency and acceleration of each vibration was obtained from the software along with the FFT report of each event. Monitoring of ground vibration using geophone is as shown in Figure 6.

FIGURE VI. MONITORING OF GROUND VIBRATION

D. *Regression Analysis*

The intensity of ground vibrations recorded at different distances was obtained from Blastware software. Based on this data, a regression cure was plot as peak particle velocity v/s scaled distance as shown in Figure7. From the data generated, the ground vibration propagation equation for Yanakandla limestone mining project site has been established as:

$$V = 366.2\ (D/\sqrt{W})^{-1.19}$$

where,

V = Peak particle velocity (mm/s)

D = Distance between blast site and location of instrument / structure (m)

W = Maximum explosive charge / Delay (kg)

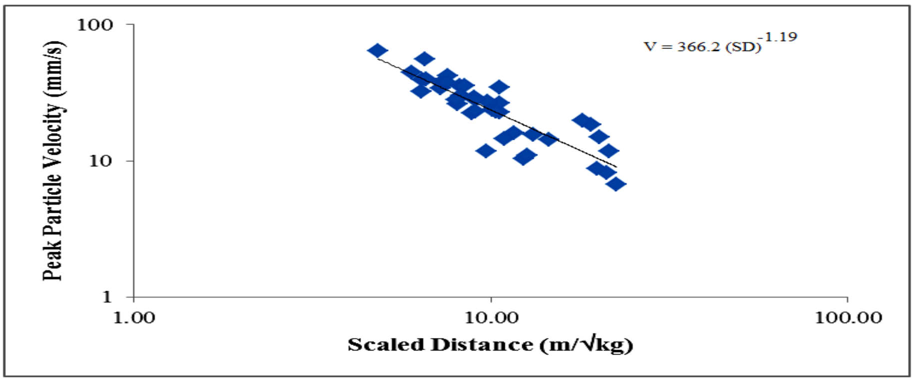

FIGURE VII. PEAK PARTICLE VELOCITY VS. SCALED DISTANCE

Using the established ground vibrations propagation equation, the expected Peak Particle Velocity values are estimated for different distances, with different explosive charges / delay. The values are tabulated and shown in Table 1.

TABLE I. EXPECTED PPV LEVELS AT DIFFERENT DISTANCES FOR DIFFERENT MAXIMUM CHARGE/DELAY

Distance (m)	Expected PPV (mm/s) levels for *MCD's of						
	10kg	15kg	20kg	25kg	30kg	35kg	40kg
30	25.2	32.0	38.0	43.4	48.4	53.1	57.4
40	17.9	22.8	27.0	30.8	34.4	37.7	40.8
50	13.7	17.5	20.7	23.6	26.4	28.9	31.3
100	6.0	7.7	9.1	10.4	11.6	12.7	13.7
150	3.7	4.7	5.6	6.4	7.1	7.8	8.5
200	2.6	3.4	4.0	4.5	5.5	5.6	6.0
250	2.0	2.6	3.1	3.5	3.9	4.3	4.6

*MCD: Maximum Explosive Charge / Delay (kg)

With 25kg of MCD, the PPVs expected are about 43mm/s at 30m distance, 31mm/s at 40m distance and 24mm/s at 50m distance. With 35kg of charge / delay, a PPV of about 53.05mm/s is expected at 30m distance, 37.67mm/s at 40m distance, 28.88mm/s at 50m distance and 12.66mm/s at 100m distance. Similarly, PPVs expected from a MCD of 30kg are 48.4mm/s at 30m, 34.37mm/s at 40m, 26.35mm/s at 50m, 11.55mm/s at 100m distance etc.

E. *Physical mechanical parameters of rock mass*

The physical mechanical parameters of rock mass required for numerical modelling were obtained through laboratory test. The rock properties of the considered strata are listed in Table 2.

TABLE II. ROCK PROPERTIES OF THE CONSIDERED STRATA

Rock Type	Density (kg/m3)	Bulk Modulus (Pa)	Rigidity Modulus (Pa)	Cohesion (KPa)	Angle of internal friction
Limestone	2500	16×10^9	6.7×10^9	2000	400

III. NUMERICAL MODELLING:

A. *Dynamic analysis by 3 DEC*

In order to study the process and mechanism of dynamic instability of slope under blast vibration load, three dimensional numerical simulations were carried out. Simulation study of canal slope stability was carried out using Three Dimensional Distinct Code (3DEC-Version3.1) developed by Itasca Consulting Group Inc. In order to set up a model to run a simulation with 3DEC, the fundamental components of a problem to be specified include a distinct element model that matches the problem geometry, constitutive behaviour and material properties, boundary and initial conditions, static and subsequent dynamic analysis. For analysis, blast load is applied and peak particle velocity was simulated at a distance of 30, 40, 50, 60m by numerical modelling. PPV, displacement and stress was analysed in each case. Also analysis was done considering a vertical joint extending to 5m and 10m below the canal bottom at a distance 30m away from the canal edge. A 3DEC model of canal slope after excavation is shown in Figure 8.

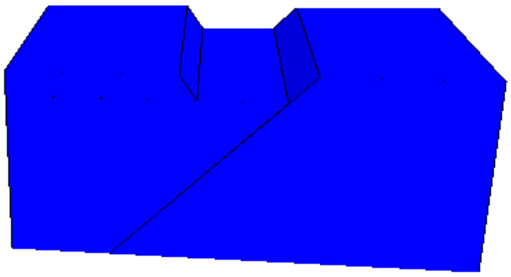

FIGURE VIII. 3DEC MODEL OF CANAL SLOPE AFTER EXCAVATION

B. *Velocity time history curve as blasting vibration input*

Vibration velocity was choosen as the physical parameter from field test using blast vibration transducers. Figure 9 shows the velocity series of blast vibration recorded from the blast site under consideration with dominant frequency of 21.5Hz, lasting time of 1s, and the maximum amplitude of 0.508mm/s. The velocity time history of wave used as blasting vibration input is shown in Figure 9.

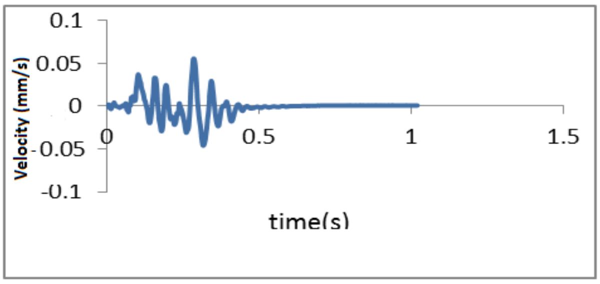

FIGURE IX. VELOCITY TIME HISTORY OF WAVE

C. *Application of dynamic load*

Inorder to find out the law of redistribution of secondary state of stress and variance of velocity and displacement under blast vibration, the whole analysis is divided into two steps which are static and dynamic analysis. In 3 DEC, acceleration,velocity,displacement and stress are the dynamic mode of input for the dynamic computation and analysis. For viscid boundary condition, dynamic loads input must be velocity.

IV. RESULTS AND DISCUSSIONS:

The distribution of maximum principle stress due to dynamic loads are shown in Figure 10. The displacement contours and velocity contours of model under blast loads are shown in figure 11 and 12. For further analysis, some points say A, B, C, D, E, F, G, H are considered along the canal slope and also below the bottom of the canal as shown in Figure 13.

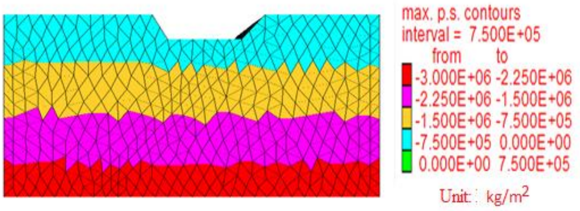

FIGURE X. DISTRIBUTION OF STRESS UNDER DYNAMIC LOADING

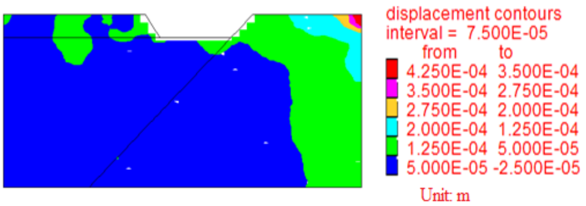

FIGURE XI. DISTRIBUTION OF DISPLACEMENT UNDER DYNAMIC LOADING

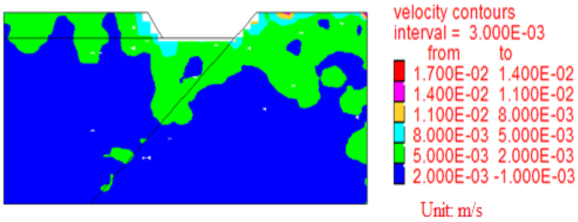

FIGURE XII. DISTRIBUTION OF VELOCITY UNDER DYNAMIC LOADING

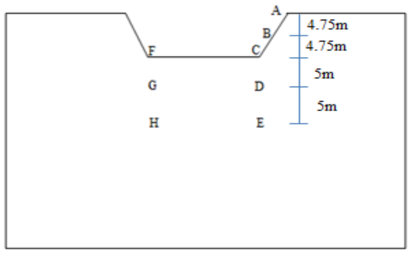

FIGURE XIII. POINTS CONSIDERED FOR ANALYSIS

The velocity time history and displacement time history generated under frequency 21.5Hz is shown in Figure 14 and 15. As a parametric study, a vertical joint of width 1mm with loose cohesive clay was also analysed. A vertical joint extended to 5m and 10m below the canal bottom was analysed to determine the effect of joints in rock mass. The displacement contours and velocity contours in the presence of vertical joint is displayed in Figure 16 and 17.

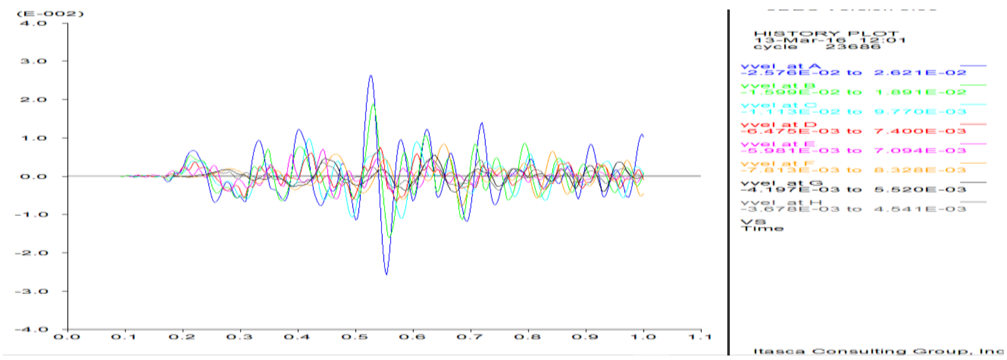

FIGURE XIV. VELOCITY TIME HISTORY GENERATED IN 3DEC UNDER FREQUENCY 21.5HZ

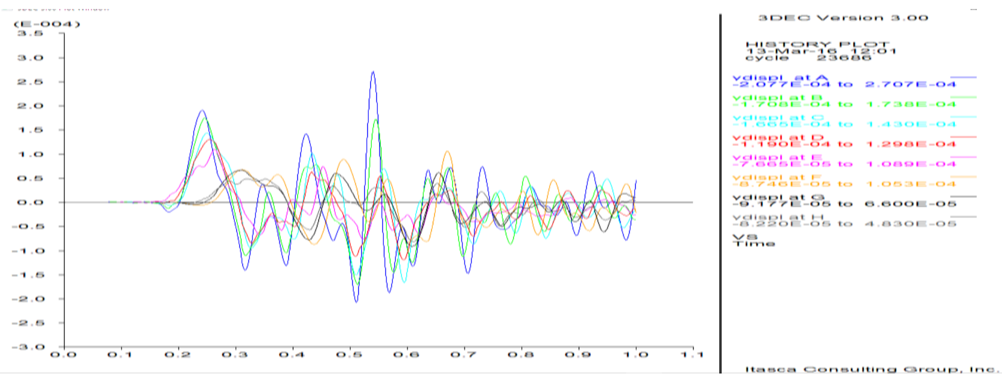

FIGURE XV. DISPLACEMENT TIME HISTORY GENERATED IN 3 DEC UNDER FREQUENCY 21.5H

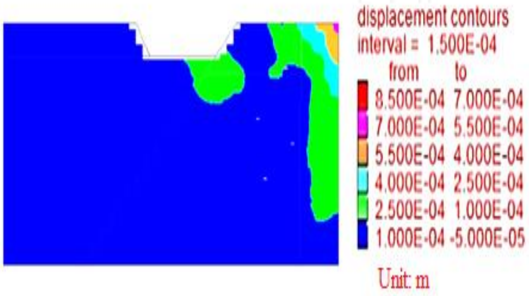

FIGURE XVI. DISTRIBUTION OF DISPLACEMENT UNDER DYNAMIC LOADING IN THE PRESENCE OF VERTICAL JOINT

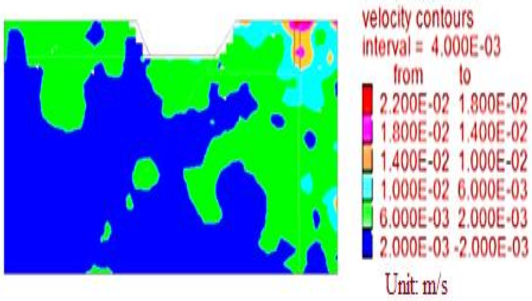

FIGURE XVII. DISTRIBUTION OF VELOCITY UNDER DYNAMIC LOADING IN THE PRESENCE OF VERTICAL JOINT.

Analysis of velocities and displacements at different distance and different points with and without vertical joints was done. Vertical velocity and vertical displacements at different distances for considered points was tabulated in Table 3 and 4. From the results obtained it can be observed that, as distance where the impact of dynamic load is considered increases, the PPV and displacement decrease. The influence of vertical joint in rock mass on vertical velocities and vertical displacements were shown in Table 5.

TABLE III. VERTICAL VELOCITY AT DIFFERENT PODINTS CONSIDERED

Points Considered	**Vertical velocity (mm/s), when blast is simulated at a distance 'X' from the slope of the canal**			
	X = 30m	*X = 40m*	*X = 50m*	*X = 60m*
A	35	33.12	26.21	25.1
B	29	18.9	18.91	17.93
C	23	22.38	11.11	18.18
D	17	9.87	7.4	8.24
E	14	9.05	7.09	11.24
F	21	9.86	8.33	19.15
G	14	7.5	5.52	13.41
H	9.7	6.07	4.54	6.22

TABLE IV. VERTICAL DISPLACEMENT AT DIFFERENT POINTS CONSIDERED

Points Considered	**Vertical displacement (mm), when blast is simulated at a distance 'X' from the slope of the canal**			
	X = 30m	*X = 40m*	*X = 50m*	*X = 60m*
A	0.41	0.373	0.271	0.264
B	0.32	0.266	0.174	0.226
C	0.31	0.276	0.166	0.206
D	0.24	0.196	0.129	0.136
E	0.21	0.165	0.109	0.123
F	0.27	0.151	0.105	0.205
G	0.23	0.115	0.092	0.145
H	0.71	0.112	0.082	0.1

TABLE V. VERTICAL VELOCITY AND VERTICAL DISPLACEMENT WITH VERTICAL JOINT AT DIFFERENT POINTS

Points Considered	**Vertical velocity (mm/s) with a joint height up to 'Z' m below canal bottom**		**Vertical displacement (mm) with a joint height up to 'Z' m below canal bottom**	
	Z = 5m	*Z = 10m*	*Z = 5m*	*Z = 5m*
A	22.92	14.34	0.266	0.202
B	20.75	18.25	0.235	0.239
C	15.16	13.15	0.185	0.232
D	8.04	6.45	0.167	0.186
E	7.51	9.79	0.156	0.149
F	10.83	9.87	0.157	0.13
G	9.55	6.74	0.59	0.127
H	4.79	5.23	0.114	0.124

V. CONCLUSIONS

1. The PPV values obtained from regression analysis using field vibration monitoring data and the results from numerical modelling shows approximately same values.

2. Presence of vertical joint reduces the PPV and the displacement values and as the height of the vertical joint increases, it further reduces PPV and displacement.

3. As the distance of application of blast load increases from point of observation, the PPV and the displacement values decreases. Velocity and displacement will be maximum at surface and it reduces at it go deeper.

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