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PRESS RELEASE

Ground breaking research to minimize the adverse effects of blasting carried in mines for excavation

Optimization of seismic energy released during blasting in mines

During the lockdown, when the world was dealing with the devastating effects of the Covid Pandemic, including social, financial, and psychological effects, a team of Mining Engineering Department of Dhanbad's premier tech cradle IIT (ISM) Dhanbad conducted a study to find ways of minimizing the various effects of blasting in mines, such as house collapse and habitat discomfort, caused by ground vibration.

The team comprising of a PhD student of Mining Engineering department, Anurag Agarwal, a native resident of Chhattisgarh who carried out the research under the guidance of his faculty members including his research guide Dr. B.S. Choudhary and senior faculty Dr. VMSR Murthy from March 2020 to December 2020 in the coal mines of Jharia, the dolomite stone mines of Gaya in Bihar, and the limestone mines of Rajasthan proposed a blasting design that can help to reduce blasting-induced environmental issues.

In his nine-month survey and data analysis, Agarwal found out that the average percentage of explosive energy conversion into seismic energy is higher (6.12 percent) in dolomite mines than in coal mines (around 3.1 percent).

The analysis of blast vibrations, which was also performed with MATLAB, revealed that seismic energy dissipated into rock masses has a good correlation with radial distance after using the modified seismic energy prediction equation.

"Explosives used in mines are primarily aimed at fragmentation of rocks for mineral excavation, but despite significant technological development in this area, explosive utilization efficiency has not been increased," said Agarwal, adding that under current blasting practices, only less than 30% of explosive energy is used for breakage and displacement of rock masses in mines, while the remainder is wasted in unwanted effects such as ground vibration, fly rock or air overpressure, noise light etc.

Such unintended consequences of blasting frequently result in the relocation of people from mining areas, and sometimes law and order issues arise as a result of protests by blast victims.

After conducting extensive research on mine blasting, Agarwal concluded, "Seismic energy prediction in bench blasting is the key for its optimization, so our study was conducted to predict the mine blast induced seismic energy, which was analyzed using Peak Particle Velocity (PPV)."

"A modified equation to predict the conversion of explosive energy into seismic energy has been proposed as part of the research," Agarwal said, adding that the blast design proposed as part of the research, as well as the modified equation, can aid in the optimization of seismic energy released during mine blasting.

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