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Intensity Quantification of Coal and Rock Burst Risk, a Review

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ABSTRACT

A clear understanding of the intensity of rock and coal burst is the basis for future research on burst mechanism and control. There has been a wide variety in the description of rock and coal burst damage at different countries using multi-methods, which makes the common understanding even more challenging. Therefore, this paper presents a comprehensive review on the quantifications of intensity of coal and rock burst and seismic risk over the world, considering critical factors including seismic energy, magnitude, peak particle velocity and ejection velocity. It is found that the seismic energy of coal and rock burst can widely range from 2KJ to 60K MJ, with equivalent Richter magnitude from -1 to 4. The daily seismic energies can be used for seismic risk potential assessment, with energy levels from 0.1 KJ to 10 MJ, which is much lower than the burst sources. The magnitude of the seismic events can be also estimated based on the weight of damaged coal mass and human feelings on vibration and sound. For the seismic intensity represented by peak particle velocity (ppv), it keeps constant within fault radius and attenuates with a speed of $1/r^4$ and $1/r$ in near and far field respectively, thus it is possible for a small seismic event to induce considerable ppv causing severe damage if the hypocentral distance is small enough. There has not been a strong correlation between the ejection velocity of fragments when coal and rock burst occurs and ppv, as seismic energy is only one of the energy sources that contribute to the kinetic energy of burst damage.