

Mathematical modeling of blasting and analysis of crack propagation in fractured and faulty rock by PFC-3D

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Detonation of explosives to fragment rock remains central in mines, quarries and civil excavations. Whenever fractured and faulty rocks are blasted, much of the explosive energy is lost in the incompetent zones, resulting in blocky fragments. In this study circular rock models with a single central source of explosive were simulated using the Particle Flow Code 3D (PFC-3D) for the prediction of formation behavior. Using PFC-3D, we model the movement and interaction of spherical particles by the distinct element method. From the analysis of rock blasting simulations it is found that results of blasting in fractured rocks is dependent upon fracture orientation, fracture width and on the material filling the fracture. On the basis of detailed study, it is suggested that the explosive be concentrated at the competent rock portion while the fractured and incompetent zones be stemmed. The investigation also confirms that the use of high specific charge cannot solve the problem, but may cause fly rock.