Study on dynamic strength of sandstone based on SHPB numerical experimentation

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It is unavoidable that in rock engineering practices such as mining and tunnel constructions rocks are subjected to dynamic loading impacts including blasting, seismic loading, rock burst, and so on. The mechanical parameters for rock strength obtained via traditional static tests are not capable of characterizing the dynamic strength of rock mass. Therefore, the conventionally adopted tests cannot be further applied to guide the design of rock engineering subjected to dynamic loadings. Therefore the determination of the dynamic strength is essential for practical engineering. In this study, sandstone is chosen as the experimental sample for Split Hopkinson Pressure Bar (SHPB) numerical simulation by FLAC3D. The validation demonstrated that rocks are prone to fail under dynamic loading impacts. Extensive simulations are also carried out to investigate the development of rock dynamic strength and evolution process of energy accumulation and release in rock mass for samples of various sizes subjected to different levels of dynamic loading and axial loading. The simulation results may provide design guidance for the safety protection of rock engineering subjected to dynamic impacts.