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# Investigation into rockslides by the adaptive rock discrete fracture analysis (RDFA) method

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The rock discrete fracture analysis (RDFA) method was proposed as a combination of the rock failure process analysis method and the discrete element method. Leveraging the statistical strength theory and contact mechanics, it can effectively capture the intricate continuum-discontinuum behaviors inherent in rock mechanics, encompassing fracture and fragmentation phenomena. Enabled by a sophisticated nodal updating scheme, RDFA can dynamically adjust nodes at critical crack tips in accordance with strength criteria, facilitating accurate modeling of zero-thickness crack initiation and propagation. Noteworthy is its capacity to accommodate the inherent heterogeneity of rock masses, enabling holistic consideration of localized damage and fine crack development. Rigorously validated through the Brazilian disc and uniaxial compression tests, RDFA consistently aligns with the analytical solutions and experimental data. After that, it was applied to analyze the rockslide characteristics at the Anshan Road station in the Qingdao metro, China, and illuminated crucial insights. The results show that in the presence of 60° oriented joints with 5m spacing, the high stress concentration primarily emerged at the slope toe, leading to the localized tensile damage and the formation of a sliding surface. Subsequent rock sliding induced compression and collision among blocks, precipitating continuous failure within the sliding body. Additionally, the presence of intermittent joints notably contributed to progressive rockslide, particularly triggering the localized failures in the lower part of the slope.

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