Paper Number: 1787

Influence of confining pressure on the mechanical mechanism of soil-rock mixture

XIA Jiaguo[1,2], HU Ruilin[1],GAO Wei[1]

1. Key Laboratory of Shale Gas and Geoengineering (KLSGG), Institute of Geology and Geophysics, Chinese Academy of Sciences.

2. University of the Chinese Academy of Sciences, Beijing, China

---

Soil-rock mixtures are widespread in nature, and differ significantly from soil and rock in mechanical properties and deformation behavior due to their inhomogeneous and discontinuous nature. Mechanical mechanisms of soil-rock mixtures sheared under different confining pressures are also quite different from each other. The results show that the strength of soil-rock mixtures decreases with the increase of rock blocks under uniaxial compressive conditions, but increases with the increase of blocks under triaxial compressive conditions.

The interfaces of block and matrix within the specimen are planes of weakness. With the increase of blocks, the density of weakness surfaces increases which will result in the decrease of strength; however, the interlocking force formed by the lockup between blocks during shearing under different confining pressures enhances the strength of soil-rock mixtures; these two contradictory effects make for a confused variation in results with the increase of blocks.

Under uniaxial compressive conditions (the confining pressure is 0), the specimen is in an open system, and the radical expansion is relatively easy due to the existence of the weakness surfaces. The weak-face effect plays an important role in mechanical strength under this condition, so that the strength decreases with the increase of blocks. However, the specimen is in a relatively closed system when the confining pressure is high enough under triaxial compressive conditions, such that the radical strain is constrained and the blocks inside the specimen are interlocked which contributes to the mechanical strength of soil-rock mixture being high, so that the strength increases with the increase of blocks.

Keywords: soil-rock mixture; confining pressure; weakness surface; interlocking force