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Properties of comminuted granite subjected to uniaxial compression and direct shear tests

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The comminuted granite articles, formed by the uniaxial compression test showed the particle shapes such as needle, sheet and pillar with irregular and sharp edges. The granite particles formed by the alternated method, were subjected to direct shear tests at 10 mm/30 min. The many particles over several ten microns in diameter were characterized by nearly polygonal shape under normal stress of 4.5 kgf/cm^2. On the other hand, under less than normal stress of 2.25 kgf/cm^2, the shape of particles of more than one micron in diameter slightly changed.

The specimens for the uniaxial compression test were roughly 2 to 5 cm in length and 1.2 to 1.7 cm in diameter. The normal fracture stress was 91˜137 MPa. The specific surface area of the comminuted particle of granite particles was measured by gas adsorption, using the BET method with argon gas.

The specific surface area of the comminuted particles formed by the uniaxial compression tests increased with increasing elastic strain energy density, in roughly linear manner. In the case of the direct shear tests, the degree of the surface area increased, under normal stress, more than 3.375 kgf/cm^2. The results of the comminution experiment tests on granite suggest that the relation between changes in the specific surface area of comminuted particles and the elastic strain energy density is consistent with low comminution energy according to Rittinger hypothesis.

Keywords: Rittinger’s hypothesis, comminuted particles, elastic strain energy density, specific surface area