

Fracture, Tectonics and Engineering Geology

COSGROVE, J. W. Earth Sciences, T. H. Huxley School,
Royal School of Mines, Imperial College, London SW7 2BP, UK.

The mechanical principles of brittle failure and fracture mechanics are common to problems of rock failure studied by structural geologists, workers in the field of rock mechanics and engineering geologists. The different expressions of failure simply reflect the different boundary conditions under which the deformation takes place.

These three groups of Earth scientists are concerned with fractured rock masses, the structural geologist is primarily concerned with their generation whereas the other workers are concerned with their properties.

An understanding of the process by which a fractured rock mass is gradually built up through geological time by the successive superposition of different fracture sets provides an insight into properties of the rock mass as it undergoes the transition from an intact rock body through a fractured body to what ultimately may become a rock mass made up of isolated, individual blocks.

The stress fields associated with the later fracture sets are deflected and modified by the pre-existing fractures. This degradation of the stress field is reflected in the new fracture set which it forms. Later sets become progressively less regular as their causative stress fields become modified and fracture development is impeded by existing fractures. Because of this it is often possible to determine the chronology of the different fracture sets making up a network and to tie this into the known tectonic evolution of a region. This detailed knowledge of the fracture network enables the properties of the rock mass, particularly fracture connectivity and strength to be estimated.