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D.C.P. Peacock, D.J. Sanderson, A. Rotevatn

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Relationships between fractures

D.C.P. Peacock[1], D.J. Sanderson[2] & A. Rotevatn[1]

[1] Department of Earth Science, University of Bergen, Allégaten 41, 5007 Bergen, Norway

[2] Engineering and the Environment, University of Southampton, Highfield, Southampton, SO17 1BJ, UK

Abstract

Fracture systems comprise many fractures that may be grouped into sets based on their orientation, type and relative age. The fractures are often arranged in a network that involves fracture branches that interact with one another. Interacting fractures are termed *geometrically coupled* when they share an intersection line and/or *kinematically coupled* when the displacements, stresses and strains of one fracture influences those of the other.

Fracture interactions are characterised in terms of the following. 1) Fracture type: for example, whether they have opening (e.g., joints, veins, dykes), closing (stylolites, compaction bands), shearing (e.g., faults, deformation bands) or mixed-mode displacements. 2) Geometry (e.g., relative orientations) and topology (the arrangement of the fractures, including their connectivity). 3) Chronology: the relative ages of the fractures. 4) Kinematics: the displacement distributions of the interacting fractures. It is also suggested that interaction can be characterised in terms of mechanics, e.g., the effects of the interaction on the stress field. It is insufficient to describe only the components of a fracture network, with fuller understanding coming from determining the interactions between the different components of the network.

Key words: fractures; interaction; geometry; kinematics; chronology