

Bloomfield, John . 1996 Characterisation of hydrogeologically significant fracture distributions in the Chalk: an example from the Upper Chalk of Southern England. *Journal of Hydrology*, 184 (3-4). 355-379. [10.1016/0022-1694\(95\)02954-0](https://doi.org/10.1016/0022-1694(95)02954-0)

Fractures pervade the Chalk, and are the primary pathways for rapid flow and contaminant migration. Improved quantitative descriptions of their geometry and scaling characteristics are essential for the development of predictive transport models. Fracture aperture and fracture connectivity are the most critical properties in controlling transport. To provide examples of fracture characteristics in the Upper Chalk, four fracture parameters—fracture orientation, trace length, spacing and aperture—have been measured using section and scan-line surveys at Play Hatch Quarry, near Reading, Berkshire. Three fracture types have been investigated: joints, bedding plane fractures and faults. Unrefined, or global, joint trace length and spacing measurements approximate to negative exponential distributions, with means of 0.09 m and 0.02 m. The trace length and spacing distributions of the two dominant joint sets, i.e. the bedding parallel joint set and the joints at a high angle to bedding, approximate to log-normal distributions, with geometric mean trace lengths of 0.15 m and 0.3 m, and spacings of 0.10 m and 0.12 m, respectively. Calculated fracture interconnectivity indices suggest that the bedding parallel joint set is likely to be of greater hydraulic importance than the high-angle joint set. Aperture measurements obtained for a single bedding plane fracture range from less than 0.5 mm to 23.5 mm. Apertures approximate to a negative exponential distribution below 7 mm, and to a log-normal distribution above 7 mm. It is inferred that the larger apertures have been affected by solution processes and that flow through bedding plane fractures is channelled across 10–20% of the fracture surface area. There are insufficient data for a rigorous analysis of the faulting at Play Hatch Quarry, but it is expected that faulting in the Chalk will show scale-invariant length and spacing characteristics. The results of the study are consistent with a visualisation of the Chalk consisting of scale-invariant fault-bounded segments, where the internal fracture architecture of each segment is dominated by continuous bedding plane fractures, and subordinate, scale-dependent, arrays of joints. The scale of jointing within a given fault-bounded segment is a function of bedding thickness.