Spatial Modelling and Prediction of Local Fault Parameter Distributions for Reservoir Characterization

[1]Wen ,R, [2]Sinding-Larsen,R,. [1]Geomodelling Corp., Calgary, Canada. [2]Department of Geology and Mineral Resources Engineering, Norwegian University of Science and Technology, Trondheim, Norway.

Spatial modelling of faults in petroleum reservoirs can be made either by the object-based approach or by the cell-based geostatistical approach. This study from the Snorre area of the North Sea compares the two approaches in terms of model assumptions and uncertainty of the modelling results. The comparison of both methodologies in the Snorre area reveals that the uncertainty in the results from the object-based approach is larger than the cell-based geostatistical approach. In the object-based approach, faults in the reservoir are represented as arrays of single objects. Spatial modelling of faults in this approach consists of two steps: modelling of single faultsand modelling of a fault population. A major problem in this approach is the ambiguity of defining single faults from a fault network. The so-called fractal dimension of the fault length distribution is found to be dependent on the definition of single faults when fault lengths are measured along faults, hence avoiding the ambiguity of identifying single faults. Indicator variograms of throw, dip angle and dip azimuth characterizes the spatial variability and anisotropy of faults. A practical problem in this approach is the estimation of indicator variograms of small faults below the seismic resolutions. An ad-hoc solution is suggested.

Key Words: Spatial modelling of faults, conditional local probability distributions, fault size distribution, Snorre area.