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Fault Seal Analysis Across Growth Faults: The Impact of Uncertainty on Connectivity and Sealing

Growth faulting poses a range of challenges to the geologist tasked with fault seal prediction and analysis. We present a methodology for calculating the probability of communication between reservoirs within complex sediment packages across these faults.

The calculation of reservoir juxtaposition and potential for sealing across faults often consider fault geometry and reservoir/seal lithology where the lithology either side of fault is considered to be consistent. However with a growth fault lithological thicknesses and shale contents can vary radically. In many circumstances there is great uncertainty on these parameters. This a common observation in exploration and appraisal where wells are often drilled in either the up-thrown or down-thrown fault blocks.

Using a generalized fault displacement model and stochastic techniques we have considered the uncertainty of variance/absence of beds thickness and V-Shale (Vsh) across a fault. Probabilistic Alan maps are generated and a connectivity tables (graphs) produced based on juxtaposition.

On either side of the growth fault we calculated Shale Gouge Ratios (SGR) for the hanging wall and footwall fault plane maps. With low SGR (Sand Smear) we add connectivity to the graph and with high SGR (Shale Smear) remove connections.