NEW STRUCTURAL FRAMEWORK TECHNIQUES FOR MODELING LOW ANGLE AND THRUST FAULTS

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Although thrust faults and low angle faults are common structural features, they are relatively uncommon in reservoir grids – at least in their actual geologic configuration. These types of faults often have to be modified in order to fit the constraints of grid builders, and these modifications can have significant impact on the validity of the resultant model.

Pillar gridding methods often have limitations when fault dips are less than 45 degrees; it is usually difficult if not impossible to stair-step, or regularize, the cell edges in Z axis along these faults. Fault/fault intersections of low angle faults also present their own sets of difficulties; modeling systems often do not allow staircasing of two intersecting low angle faults. As vertical cell edges are frequently desired for a simulation grid, faults are shifted or modified to meet the requirements of the modeling system. The limitations thus prevent the reservoir engineer from using a correct geologic model, and different parts of the asset team no longer use a truly shared earth model.

Our technique, using a fused fault block approach to fault modeling, eliminates these restrictions. This technique does not use pillars or nodes to define a fault network, but rather uses a modified binary tree where implicit fault relationships do not require an explicit definition in the tree. Using this technique, not only can correct geologic model to be built, but the reservoir grid calculated from this model can be generated with aligned or staircased cells as the engineer desires. With thrust faults, the staircased grid maintains the layer connections across the faults, allowing this grid to be used for facies modeling, attribute modeling, or reservoir simulation. All parts of the asset team can now use the same model, even in areas with extremely complex fault patterns.