

GLOBAL GRID BUILDING IN REVERSE FAULTED AREAS BY AN OPTIMIZED UNFAULTING METHOD

TECHNICAL FIELD

[0001] This patent document pertains generally to an unfaulinging method, and more particularly, but not by way of limitation, to global grid building in reverse faulted areas by an optimized unfaulinging method.

BACKGROUND

[0002] Geological faults occur when there has been a fracture along which the blocks of the earth's crust (e.g., fault blocks) on either side have moved relative to one another parallel to the fracture (e.g., the fault plane). By definition, the fault block that is above the fault plane is considered the hanging wall and the fault block that is below the fault plane is defined as the footwall. Different types of faults are classified based on the orientation of the fault blocks. For example, a "normal fault" occurs when the hanging wall moves down relative to the footwall and may occur when there is an expansion of the crust. Alternatively, a "reverse fault" occurs when the hanging wall moves up relative to the footwall and occurs when the crust is compressed. A model may be generated that represents a reverse fault, however, the model may have duplicate cell coordinates along a reverse fault.

SUMMARY OF INVENTION

[0002a] A first aspect of the present invention provides a method comprising:

storing on a storage device, at least one data structure representing a plurality of fault blocks associated with one or more faults in a geographic formation;

selecting two fault blocks of the plurality of fault blocks associated with a fault of the one or more faults;

changing the position of a first of the two fault blocks in the at least one data structure, using at least one processor, representative of a shift of the first fault block towards the other fault block of the two fault blocks to position the center of gravity of a fault boundary of the first fault block with the center of gravity of a fault boundary of the other fault block;

after performing the shift, aligning the first fault block with the other fault block according to a permitted level of conflict between fault blocks; and

updating the at least one data structure to indicate a merging of the two selected fault blocks into an unfaulted block after the alignment.

[0002b] A second aspect of the present invention provides a computer-readable storage device with instructions stored thereon, which when executed by one or more processors, configure the one or more processors to perform operations comprising:

storing on a storage device, at least one data structure representing a plurality of fault blocks associated with one or more faults in a geographic formation;

selecting two fault blocks of the plurality of fault blocks associated with a fault of the one or more faults;

changing the position of a first of the two fault blocks in the at least one data structure, using at least one processor, representative of a shift of the first fault block towards the other fault block of the two fault blocks to position the center of gravity of a fault boundary of the first fault block with the center of gravity of a fault boundary of the other fault block;

after performing the shift, aligning the first fault block with the other fault block according to a permitted level of conflict between fault blocks; and
updating the at least one data structure to indicate a merging of the two selected fault blocks into an unfaulted block after the alignment.

[0002c] A third aspect of the present invention provides a system comprising:

one or more processors;

a storage device with instruction stored thereon; and

wherein when the instructions are executed by the one or more processors, the one or more processors are configured to perform operations comprising:

storing on the storage device, at least one data structure representing a plurality of fault blocks associated with one or more faults in a geographic formation;

selecting two fault blocks of the plurality of fault blocks associated with a fault of the one or more faults;

changing the position of a first of the two fault blocks in the at least one data structure, using at least one processor, representative of a shift of the first fault block towards the other fault block of the two fault blocks to position the center of gravity of a fault boundary of the first fault block with the center of gravity of a fault boundary of the other fault block;

after performing the shift, aligning the first fault block with the other fault block according to a permitted level of conflict between fault blocks; and

updating the at least one data structure to indicate a merging of the two selected fault blocks into an unfaulted block after the alignment.

BRIEF DESCRIPTION OF DRAWINGS

[0003] Some embodiments are illustrated by way of example and not limitation in the figures of the accompanying drawings in which:

[0004] FIG. 1 is a map-view of a geographical formation, according to an example embodiment.

[0005] FIGS. 2A and 2B are example geocellular grids, according to various example embodiments.

[0006] FIG. 3 is a block diagram illustrating an unfaulting application, according to an example embodiment.