AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listings of claims in the application.

1. A computer implemented method for extracting or estimating ~~rock properties~~ velocity and density from seismic traces comprising the following steps:

preparing an initial model with initial functions (200) of velocity and density taken ~~taking~~ as constants or measured by obtaining seismic trace(s) or measured by obtaining borehole logs,

generating synthetic trace(s) (205) from the initial functions of velocity and density function(s) with added artificial kinematic constraints (220) and randomly updating the initial functions of velocity and density in random start and length time or depth window(s),

creating updated synthetic traces (215), using randomly updated the velocity and density functions,

wherein for each iteration, artificial wave(s) traveling from a source point to a reflection point and back to any receiver are simulated as a constraint,

performing a search of a misfit object function of any norm between original or real trace(s) ~~original/or real trace or traces~~ and the synthetic trace(s) generated in the following iteration,

using probabilistic techniques for approximating the global optimum and minimizing the cost function associated with the seismic trace(s) mismatch.

2. The computer implemented method of claim 1, wherein the window(s) can be of a fixed length and/or fixed starting point.

3. The computer implemented method of claim 1, wherein the receiver and source in the same position can be propagated from any other offset and/or angle.

4. The computer implemented method of claim 1, wherein the computer implemented method uses initial function of acquired or computed or constructed shear wave velocity.

5. The computer implemented method of claim 1, wherein simulation or modelling of any artificial waves, the offset or angle or several offsets or angles of measured or obtained traces are used.

6.   The computer implemented method of claims 1, 3, 4 and 5, wherein a penalty term (225) is used to limit or end the iteration, minimizing the cost function associated with the mismatch to the alignment offset or angle seismic traces at each or several time event or reflecting point(s) of a seismic wave.

7.   The computer implemented method of claim 1, wherein the new post-stack case is used as an initial step in a new workflow for inversion providing more accurate non-coupled Vp, Vs and density estimation.

8.   The computer implemented method of claim 6 or 7, wherein the alignment offset or angle seismic traces is done for several events.

9.   A computer program comprising instructions which, when the program is executed by a computer, cause the computer to carry out the steps of the computer implemented method of claims 1 to 8.

10.   A data processing system comprising a processor configured to perform the steps of the computer implemented method of claims 1 to 9.