METHOD AND APPARATUS FOR SEISMIC DATA INVERSION

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a non-provisional application claiming priority to U.S. provisional patent application No. 63/308,152 filed February 9, 2022, and entitled "Method and Apparatus for Seismic Data Inversion," which is hereby incorporated herein by reference in its entirety for all purposes.

BACKGROUND

[0002] The present disclosure relates generally to implementing seismic inversion.

[0003] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the present disclosure, which are described and/or claimed below. This discussion is believed to be helpful in providing the reader with background information to facilitate a better understanding of the various aspects of the present disclosure. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

[0004] A seismic survey includes generating an image or map of a subsurface region of the Earth by sending sound energy down into the ground and recording the reflected sound energy that returns from the geological layers within the subsurface region. During a seismic survey, an energy source is placed at various locations on or above the surface region of the Earth, which may include hydrocarbon deposits. Each time the source is activated, the source generates a seismic (e.g., sound wave) signal that travels downward through the Earth, is reflected, and, upon its return, is recorded using one or more receivers disposed on or above the subsurface region of the Earth. The seismic data recorded by the receivers may then be used to create an image or profile of the corresponding subsurface region.

SUMMARY

[0004a] According to a first aspect of the present disclosure, there is provided a method, including: generating initial input data based at least in part on initial seismic data; modeling the initial input data to generate synthetic seismic data based on different combinations of the initial input data; iteratively updating a value of each particle of a set of particles utilizing the synthetic seismic data to generate a final set of particles; and outputting the final set of particles as a target distribution.

[0004b] According to a second aspect of the present disclosure, there is provided a tangible and non-transitory machine readable medium, comprising instructions to cause a processor to: generate initial input data comprising based on initial seismic data; model the initial input data to generate synthetic seismic data based on different combinations of the initial input data; iteratively update a value of each particle of a set of particles utilizing the synthetic seismic data to generate a final set of particles; and output the final set of particles as a target distribution.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Various aspects of this disclosure may be better understood upon reading the following detailed description and upon reference to the drawings in which:

[0006] FIG. 1 illustrates a flow chart of various processes that may be performed based on analysis of seismic data acquired via a seismic survey system;

[0007] FIG. 2 illustrates a marine survey system in a marine environment;

[0008] FIG. 3 illustrates a land survey system in a land environment;