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- (71) **Applicants (for all designated States except US):** **CHEVRON U.S.A. INC.** [US/US]; 6001 Bollinger Canyon Road, San Ramon, California 94583 (US). **LOS ALAMOS NATIONAL SECURITY LLC** [US/US]; Mail Stop A187, P.O. Box 1663, Los Alamos, New Mexico 87544 (US).
- (72) **Inventors; and**
- (75) **Inventors/Applicants (for US only):** **VU, Cung Khac** [US/US]; 2811 Lafayette Street, Houston, Texas 77005 (US). **NIHEL, Kurt T.** [US/US]; 5839 Amy Dr., Oakland, California 94618 (US). **JOHNSON, Paul A.** [US/US]; 04 CR 113 South, Santa Fe, New Mexico 87506 (US). **GUY-ER, Robert A.** [US/US]; 2020 Dickerson Rd., Reno,

Nevada 89503 (US). **TEN CATE, James A.** [US/US]; 542 Todd Loop S, Los Alamos, New Mexico 87544 (US). **LE BAS, Pierre-Yves** [FR/US]; 625 La Bajada, Los Alamos, New Mexico 87544 (US). **LARMAT, Carene S.** [FR/US]; 1051 11th Street, Los Alamos, New Mexico 87544 (US).

(74) **Agents:** **PEREZ, Robert C.F.** et al.; Pillsbury Winthrop Shaw Pittman LLP, P.O. Box 10500, McLean, Virginia 22102 (US).

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(54) **Title:** SYSTEM AND METHOD FOR GENERATING MICRO-SEISMIC EVENTS AND CHARACTERIZING PROPERTIES OF A MEDIUM WITH NON-LINEAR ACOUSTIC INTERACTIONS

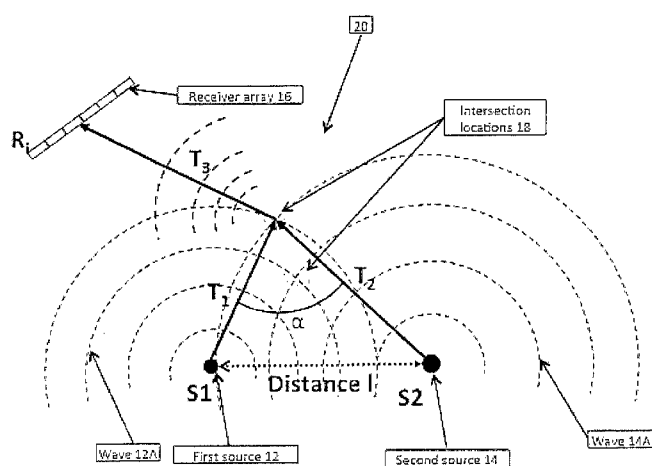


FIG.1

(57) **Abstract:** A method and system for generating a micro-seismic event in a medium from a non-linear interaction to characterize the medium is provided. The method includes generating, by a first acoustic source (S1, 12), a first coded acoustic signal comprising a first plurality of pulses arranged as a time sequence, each pulse comprising a modulated signal at a central frequency; and generating, by a second acoustic source (S2, 14), a second coded acoustic signal comprising a second plurality of pulses arranged as a time sequence, wherein each pulse comprises a modulated signal and a central frequency of the modulated signal within each pulse in the second plurality of pulses is a selected fraction d of the central frequency of the modulated signal for the corresponding pulse in the first plurality of pulses. The method further includes receiving, by a receiver (R), a detected signal including a third signal being generated by a non-linear mixing process from the first acoustic signal and the second acoustic signal in the mixing zone; performing, by a processor, data processing on the received signal, or correlating with a coded signal template, or both, to extract the third signal generated by the non-linear mixing process over noise or over signals generated by a linear interaction process, or both, to obtain an emulated micro-seismic event signal occurring at the mixing zone; and characterizing properties of the medium or creating a 3D image of the properties of the medium, or both, based on the emulated micro-seismic event signal.

tion process, or both, to obtain an emulated micro-seismic event signal occurring at the mixing zone; and characterizing properties of the medium or creating a 3D image of the properties of the medium, or both, based on the emulated micro-seismic event signal.



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