

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
24 September 2009 (24.09.2009)

PCT

(10) International Publication Number
WO 2009/117174 A1

(51) International Patent Classification:
G01V 3/18 (2006.01)

(21) International Application Number:
PCT/US2009/032010

(22) International Filing Date:
26 January 2009 (26.01.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/070,297 21 March 2008 (21.03.2008) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

Published:

— with international search report (Art. 21(3))

(54) Title: AN EFFICIENT METHOD FOR INVERSION OF GEOPHYSICAL DATA

(57) Abstract: A method for efficient inversion of measured geophysical data from a subsurface region to prospect for hydrocarbons. Gathers of measured data (40) are encoded (60) using a set of non-equivalent encoding functions (30). Then all data records in each encoded gather that correspond to a single receiver are summed (60), repeating for each receiver to generate a simultaneous encoded gather (80). The method employs iterative, local optimization of a cost function to invert the encoded gathers of simultaneous source data. An adjoint method is used to calculate the gradients of the cost function needed for the local optimization process (100). The inverted data yields a physical properties model (110) of the subsurface region that, after iterative updating, can indicate presence of accumulations of hydrocarbons.



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