



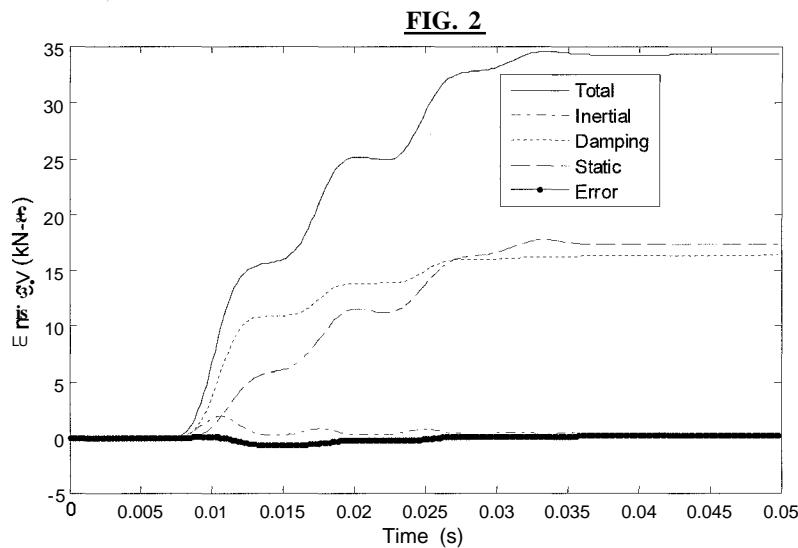
- (51) **International Patent Classification:**  
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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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[Continued on nextpage]

(54) **Title:** DETECTION OF STATIC TIP RESISTANCE OF A PILE



(57) **Abstract:** Systems and methods are provided for dynamically determining a static tip resistance of a dynamically-loaded component having a tip. One example method comprises receiving gauge data from one or more gauges associated with the component proximate the tip. The gauge data may represent measurements related to one or more impacts on the component. The example method may further comprise determining measured data and estimated data corresponding to the one or more impacts on the component based at least in part on the gauge data. Furthermore, the method may comprise performing an inversion to select the estimated data having the least amount of difference in comparison to the measured data. The method may also comprise determining the static tip resistance based at least in part on the selected estimated data.

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**A. CLASSIFICATION OF SUBJECT MATTER****E21B 47/00(2006.01)i, G01 V 9/00(2006.01)I**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

E21B 47/00; G06F 17/10; G01N 3/34; E02D 7/00; G01L 5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: dynamically-loaded component, pile, static tip resistance, gauge data, strain gauge, accelerometer gauge, low-pass filter and global genetic inversion

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6533502 B2 (MCVAY, MICHAEL c. et al.) 18 March 2003 See column 9, line 27 - column 11, line 35 and figure 2.	1-21
A	US 4586366 A (MILBERGER, LIONEL J.) 06 May 1986 See column 3, line 65 - column 5, line 42 and figures 1A - 3.	1-21
A	US 5581013 A (FREDERICK, LEONARD L.) 03 December 1996 See column 3, line 57 - column 4, line 34 and figures 1 - 6, 13.	1-21
A	US 2003-0216894 A1 (GHABOUSSI, JAMSHID et al.) 20 November 2003 See paragraphs 0033, 0055 and figures 1, 15 - 17.	1-21

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2012/026473**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6533502 B2	18.03.2003	AU 2002-2443 16 B2 CA 2479782 A1 CA 2479782 C CN 1547636 A CN 1547636 CO EP 1389248 A1 EP 1389248 A4 HK 1071175 A1 JP 03-9 19664 B2 JP 2004-526085 A JP 2004-526085 T US 2002-0148298 A1 Wo 2002-084032 A1	20.07.2006 24.10.2002 14.09.2010 17.11.2004 30.08.2006 18.02.2004 21.09.2005 09.02.2007 30.05.2007 26.08.2004 26.08.2004 17.10.2002 24.10.2002
US 4586366 A	06.05.1986	None	
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US 2003-02 16894 A1	20.11.2003	US 2009- 112489 A1 US 7447614 B2 US 8095344 B2	30.04.2009 04.11.2008 10.01.2012