(12) 按照专利合作条约所公布的国际申请

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(30) 优先权:
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(71) 申请人 (对除美国外的所有指定国): **隆鑫通用动力股份有限公司 (LONCIN MOTOR CO., LTD.)** [CN/CN]; 中国重庆市九龙坡区九龙园区华龙大道 99 号, Chongqing 400052 (CN)。

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(81) 指定国 (除另有指明，要求每一种可提供的国家保护): 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) 指定国 (除另有指明，要求每一种可提供的地区保护): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), 欧洲 (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)。

本国际公布:
— 包括国际检索报告(条约第 21 条(3))。

(88) 国际检索报告公布日期: 2012 年 11 月 8 日

(54) Title: MULTIPLE-FREQUENCY INVERSION METHOD AND CONTROL APPARATUS FOR INTERNAL-COMBUSTION DRIVEN GENERATOR

(54) 发明名称 : 一种内燃机驱动发电机的倍频逆变方法和控制装置

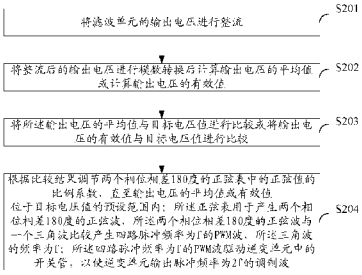

图 2 /FIG. 2

S201 RECTIFY THE OUTPUT VOLTAGE OF A FILTER UNIT
S202 AFTER PERFORMING ANALOG-TO-DIGITAL CONVERSION FOR THE RECTIFIED OUTPUT VOLTAGE, CALCULATE AN AVERAGE VALUE FOR THE OUTPUT VOLTAGE OR A VALID VALUE FOR THE OUTPUT VOLTAGE
S203 COMPARE THE AVERAGE VALUE OF THE OUTPUT VOLTAGE WITH A TARGET VOLTAGE VALUE OR COMPARING THE VALID VALUE OF THE OUTPUT VOLTAGE WITH A TARGET VOLTAGE VALUE
S204 ACCORDING TO THE COMPARISON RESULTS, ADJUST THE RATIO OF THE SINE VALUE IN THE SINE TABLE WITH A 180-DEGREE PHASE DIFFERENCE BETWEEN TWO PHASES UNTIL THE AVERAGE VALUE OR VALID VALUE OF THE OUTPUT VOLTAGE FALLS WITHIN A PRESET RANGE OF THE TARGET VOLTAGE VALUE; THE SINE TABLE IS USED TO GENERATE TWO SINE WAVES WITH A 180-DEGREE PHASE DIFFERENCE, THE SINE WAVES WITH A 180-DEGREE PHASE DIFFERENCE ARE COMPARED WITH A TRIANGLE WAVE TO GENERATE A PWM WAVE WITH A FOUR-PULSE FREQUENCY F; THE TRIANGLE WAVE HAS A FREQUENCY F; THE PWM WAVE WITH THE FOUR-PULSE FREQUENCY F DRIVES THE SWITCHING TUBES IN THE INVERSION UNIT TO ENABLE THE INVERTER UNIT TO PUT OUT MODULATED WAVES WITH A PULSE FREQUENCY 2F

(57) **Abstract**: A frequency multiplication inversion method and a control apparatus for an internal-combustion driven generator. An inversion unit employs frequency multiplication inversion technology, controlling the inversion unit through a low switching frequency f to obtain a 2f modulated frequency, thus resolving the problem that a low frequency switching component generates a high frequency modulated waveform. Four switching tubes in the inversion unit have the same work frequency, alleviating the controller load. In addition, a high modulated frequency reduces the device parameters of a filter unit, resulting in a smaller-sized and lighter apparatus, thus giving the generator portability. Reduction of the device parameters of the filter unit means reduction of the output internal resistance of the generator, therefore increasing the non-linear load capability of the generator.

[见续页]

WO 2012/122895 A3

(57) 摘要:

一种内燃机驱动发电机的倍频逆变方法和控制装置，逆变单元采用倍频逆变技术，通过较低的开关频率 f 控制逆变单元获得 2f 的调制频率，解决了低频开关元件产生高频调制波形的矛盾；逆变单元中的四个开关管的工作频率相同，减轻了控制器的负担；并且高的调制频率使滤波单元的器件参数减小，使得整个装置的体积更小，重量更轻，体现了该发电机的便携性；滤波单元的器件参数减小相当于减小了发电机的输出内抗，增加了发电机带非线性负载的能力。

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/071832

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

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)

IPC: F02D 29/00, F02D 29/06, H02P 9/00, H02P 9/04, H02P 7/42, B60W 10/00, B60W 10/04, B60W 10/06, H02M 5/00, H02M 5/02, H02M 5/04, H02M 5/22, H02M 5/40, H02M 5/42, H02M 5/44, H02P 1/00, H02P 1/16, H02P 1/46

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

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

WPI, EPODOC, CNPAT, CNKI: filtering, contravariant, frequency doubling, triangular wave; GENERAT+, PULSE?, PWM, FREQUEN+, SINE, TRIANGULAR

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 102312737 A (LONCIN MOTOR CO., LTD.), 11 January 2012 (11.01.2012), figures 1-8, and description, paragraphs [0043]-[0094]	1-12
A	CN 1330449 A (HONDA MOTOR CO., LTD.), 09 January 2002 (09.01.2002), figure 1, and description, page 3, line 18 to page 8, line 6	1-12
A	CN 101691116 A (TANGSHAN RAILWAY VEHICLE CO., LTD.), 07 April 2010 (07.04.2010), the whole document	1-12
A	CN 2888737 Y (ZHUHAI TITANS TECHNOLOGY CO., LTD.), 11 April 2007 (11.04.2007), the whole document	1-12
A	CN 2854922 Y (ZHUHAI TITANS TECHNOLOGY CO., LTD.), 03 January 2007 (03.01.2007), the whole document	1-12
A	US 4490666 A (HITACHI, LTD.), 25 December 1984 (25.12.1984), the whole document	1-12

☐ 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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 May 2012 (16.05.2012)	
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **WANG, Jian** Telephone No.: (86-10) **62414162**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/071832

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 102312737 A	11.01.2012	None	
CN 1330449 A	09.01.2002	US 2002000722 A1	03.01.2002
		EP 1178600 A2	06.02.2002
		JP 2002017100 A	18.01.2002
		KR 20020002304 A	09.01.2002
		US 6541876 B2	01.04.2003
		TW 525342 A	21.03.2003
		CN 1225080 C	26.10.2005
		KR 100614284 B	21.08.2006
		EP 1178600 B1	09.05.2007
		DE 60128298 E	21.06.2007
		JP 3969623 B2	05.09.2007
		DE 60128298 T	03.01.2008
CN 101691116 A	07.04.2010	None	
CN 2888737 Y	11.04.2007	None	
CN 2854922 Y	03.01.2007	None	
US 4490666 A	25.12.1984	EP 0073045 A	02.03.1983
		JP 58033998 A	28.02.1983
		EP 0073045 B	10.12.1986
		DE 3274704 G	22.01.1987

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2012/071832

A. CLASSIFICATION OF SUBJECT MATTER

F02D 29/06 (2006.01) i

H02P 9/04 (2006.01) i

国际检索报告

国际申请号
PCT/CN2012/071832

A. 主题的分类

参见附加页

按照国际专利分类(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC：F02D29/00, F02D29/06, H02P9/00, H02P9/04, H02P7/42, B60W10/00, B60W10/04, B60W10/06, H02M5/00, H02M5/02, H02M5/04, H02M5/22, H02M5/40, H02M5/42, H02M5/44, H02P1/00,H02P1/16, H02P1/46

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

WPI,EPODOC,CNPAT,CNKI：滤波，逆变，倍频，正弦，三角波；GENERAT+, PULSE?, PWM, FREQUEN+, SINE, TRIANGULAR；

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
PX	CN102312737A(隆鑫通用动力股份有限公司) 11.1 月 2012 (11.01.2012) 附图 1-8、说明书第[0043]-[0094]段	1-12
A	CN1330449A (本田技研工业株式会社) 09.1 月 2002 (09.01.2002) 附图 1、说明书第 3 页第 18 行至第 8 页第 6 行	1-12
A	CN101691116A(唐山轨道客车有限责任公司) 07.4 月 2010 (07.04.2010) 全文	1-12
A	CN2888737Y(珠海泰坦科技股份有限公司) 11.4 月 2007 (11.04.2007) 全文	1-12
A	CN2854922Y(珠海泰坦科技股份有限公司) 03.1 月 2007(03.01.2007) 全文	1-12
A	US4490666A(HITACHI, LTD.) 25.12 月 1984 (25.12.1984) 全文	1-12

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
16.5 月 2012 (16.05.2012)	
ISA/CN 的名称和邮寄地址： 中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 王健 电话号码：(86-10) **62414162**

国际检索报告

关于同族专利的信息

国际申请号
PCT/CN2012/071832

检索报告中引用的专利文件	公布日期	同族专利	公布日期
CN 102312737 A	11.01.2012	无	
CN 1330449 A	09.01.2002	US 2002000722 A1	03.01.2002
		EP 1178600 A2	06.02.2002
		JP 2002017100 A	18.01.2002
		KR 20020002304 A	09.01.2002
		US 6541876 B2	01.04.2003
		TW 525342 A	21.03.2003
		CN 1225080 C	26.10.2005
		KR 100614284 B	21.08.2006
		EP 1178600 B1	09.05.2007
		DE 60128298 E	21.06.2007
		JP 3969623 B2	05.09.2007
		DE 60128298 T	03.01.2008
CN 101691116 A	07.04.2010	无	
CN 2888737 Y	11.04.2007	无	
CN 2854922 Y	03.01.2007	无	
US 4490666 A	25.12.1984	EP 0073045 A	02.03.1983
		JP 58033998 A	28.02.1983
		EP 0073045 B	10.12.1986
		DE 3274704 G	22.01.1987

国际检索报告

国际申请号
PCT/CN2012/071832

A. 主题的分类

F02D29/06 (2006.01) i

H02P9/04 (2006.01) i