**North China Electric Power University**

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**Research on Key Technologies of Partial Porous**

**Externally Pressurized Gas Bearing**

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**Research on Key Technologies of Partial Porous
Externally Pressurized Gas Bearing**

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摘 要

摘要是论文内容的高度概括，应具有独立性和自含性， 即不阅读论文的全文， 就能获得必要的信息。摘要应包括本论文的目的、主要研究内容、研究方法、创 造性成果及其理论与实际意义。摘要中不宜使用公式、化学结构式、 图表和非公 知公用的符号和术语，不标注引用文献编号。避免将摘要写成目录式的内容介绍。

关键词：关键词 1；关键词 2；关键词 3; ...... ; 关键词 5

**(Content and keywords: font 宋体, size 12pt or 小四, Paragraph Line, Spacing:20pt)**

**Abstract**

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Externally pressurized gas bearing has been widely used in the field of aviation, semiconductor, weave, and measurement apparatus because of its advantage of high accuracy, little friction, low heat distortion, long life-span, and no pollution. In this thesis, based on the domestic and overseas researching ……

**Keywords** **:** keyword 1， keyword 2，keyword 3， ...... , keyword 5

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**(Content and keywords: Times New Roman 12pt, Paragraph Line Spacing: 1.25 line)**

(Times New Roman, 18pt, bold)

**Contents**

**摘要** І

**Abstract (In English)** ІІ

**Chapter 1 Introduction** [1](#bookmark1)

1.1 Background, objective and significance of the subject [1](#bookmark2)

1.2 Developmental of gas-lubricated bearing and correlated theories [2](#bookmark3)

1.2.1 Developmental of gas-lubricated bearing [2](#bookmark4)

1.2.2 Research on static characteristics of porous externally Pressurized

gas bearing [10](#bookmark5)

……

1.3 Computational fluid dynamics and applications of correlated field......................13

……

1.5 Main research contents of this subject [16](#bookmark6)

**Chapter 2 Research on permeability of** [18](#bookmark7)

2.1 Introduction [18](#bookmark8)

2.2 Fractal geometry theory [18](#bookmark9)

……

2.4 Brief summary.... .................. .. ... ................... ............................................24

……

**Chapter 7 Conclusions and prospect**s 86

**References** 88

**Theses and other publications during the master's degree program** 96

**Acknowledgements** 97

**(The chapter title is in bold, and the titles of the articles and sections are in Times New Roman 12pt, Paragraph Line Spacing: 1.25 line)**

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**Chapter 1 Introduction**

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**1.1 Research Background**

The development of advanced technologies such as national defense industry and microelectronics industry requires precision and ultra-precision instruments and equipment, and high-speed precision instruments and equipment. …… **(Times New Roman, 12pt; Paragraph Line Spacing: 1.25 line, Indent the first line by 2 characters)**

……

**1.2 Development of Gas Lubricated Bearings**

Gas bearing is a mechanical component which supports load or reduces friction by gas film. ……

……

**1.2.1 Development of Gas Lubricated Bearings** (Times New Roman, 14pt, Bold, Paragraph Line Spacing:1.35 line, before 25pt, after 12pt)

In 1828, R.R.Willis[3] published an article on pressure distribution in orifice throttle plates, which is the earliest recorded literature on gas lubrication. ……

.......

**1.2.5 Study on Porous Gas Hydrostatic Bearing**

Because of the low pressure and compressibility of gases …… .

**<1.2.5.1> Classification of Hydrostatic Bearing** (Times New Roman, 12pt, Bold; Paragraph Line Spacing: 1.25 line, before 0.5 line)

The Porous Hydrostatic Bearings can be classified as … … ..

**<1.2.5.2> Study on the Properties of Porous Materials**

The main characteristic of the material is that it has a certain degree of....

(1) Porous materials with porous properties are made up of… …

**Chapter 4 Research on Bearing Static**

**Characteristics Based on FLUENT Software**

**4.1 Introduction**

Using existing commercial software to study flow field can avoid solving N-S equation program. ……

**4.2.3 The Setting of Boundary Conditions**

In this paper, we adopt... In each direction... From the following two formulas:

*φ*=   (4-1)

*C*2 =   (4-2)

In formula *Dp* ——Average particle diameter of porous materials (m)；

*y* ——Porosity (Pore volume as a percentage of total volume)；

*φ*——Characteristic permeability or intrinsic permeability, related to the structural properties of materials (m2).

……

**4.3.3 Analysis of FLUENT simulation results**

Figure 4-6 shows the pressure distribution in the local porous cylinder plunger and in the gas film when the radius of the local porous cylinder is different. The radii are rr=1.5mm, 2.5mm, 3.5mm and 4.5mm, respectively. From Fig.4-6, it can be seen that the throttling effect is very different because of the different throttling radius. Among them, the throttling effect with small radius is obvious. The pressure change corresponding to Fig.4-6 a) is the most obvious, while the change of Fig.4-6 d) is very small, which results in a great difference in the pressure distribution in the gas film. Thus, the bearing capacity is greatly improved with the increase of radius.



|  |
| --- |
| a) |

|  |
| --- |
| d) |

|  |
| --- |
| b) |

|  |
| --- |
| c) |

Fig.4-6 Pressure contour of bearing with partial porous plunger different radiuses

a) Pressure contour of bearing when R=1.5mm, b) Pressure contour of bearing when R=2.5mm
c) Pressure contour of bearing when R=3.5mm, d) Pressure contour of bearing when R=4.5mm

**(Times New Roman 10.5pt. The title of the figure should be set at the buttom of figures. Before the title, tag need to be set, example: “Fig 4-6”)**

**(You can also write in the following illustration)**



a) Pressure contour of bearing when R=1.5mm



c) Pressure contour of bearing when R=3.5mm

b) Pressure contour of bearing when R=2.5mm



d) Pressure contour of bearing when R=4.5mm

Fig.4-6 Pressure contour of bearing with partial porous plunger different radiuses

.........

**4.4 Conclusion**

.........

……

**Chapter 6 Experimental study on partial porous hydrostatic bearings**

**6.1 Introduction**

In the preceding chapters, the permeability of locally porous materials is studied, respectively ……

**6.2 Porous graphite permeability test**

……

The experimental data of sample No. 1 is shown in the table. 6- 1。

**Times New Roman, 10.5pt; the table need to be the standard three-lines table, title need to set on the top of table. Before the title, tag need to be set, example: “Table 6-1”**

Table 6- 1 Data of measured permeability of sample 1(Temperature: T=16℃ Height: H=5.31mm)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gas supply pressure*Ps* (MPa) | Flow measurement *M* ′(m3/h) | Flow correction value *M* (m3/s) × 10-4 | Pressure difference *ΔP* (Pa) | Lg *ΔP* | lg*M* |
| 0.15 | 0.009 | 0.02312 | 46900 | 4.67117 | -5.63601 |
| 0.2 | 0.021 | 0.04584 | 96900 | 4.98632 | -5.33876 |
| 0.25 | 0.039 | 0.07413 | 146900 | 5.16702 | -5.13001 |
| 0.3 | 0.097 | 0.16747 | 196900 | 5.29424 | -4.77606 |
| 0.35 | 0.136 | 0.21753 | 246900 | 5.39252 | -4.66248 |
| 0.4 | 0.171 | 0.25485 | 296900 | 5.47261 | -4.59372 |
| 0.45 | 0.202 | 0.28467 | 346900 | 5.54020 | -- |

……

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Table 6-1 Specimen permeability test data

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gas supply pressure*Ps*(MPa) | Flow measurement *M* ′(m3/h) | Flow correction value *M* (m3/s) × 10-4 | Pressure difference Δ*P* (Pa) | lgΔ*P* | lg*M* |
| 0.15 | 0.009 | 0.023 12 | 46 900 | 4.671 17 | -5.636 01 |
| 0.2 | 0.021 | 0.045 84 | 96 900 | 4.986 32 | -5.338 76 |
| 0.25 | 0.039 | 0.074 13 | 146 900 | 5.167 02 | -5.130 01 |
| 0.150.20.250.150.20.250.150.20.250.150.20.250.150.20.250.3 | 0.0090.0210.0390.0090.0210.0390.0090.0210.0390.0090.0210.0390.0090.0210.0390.097 | 0.023 120.045 840.074 130.023 120.045 840.074 130.023 120.045 840.074 130.023 120.045 840.074 130.023 120.045 840.074 130.167 47 | 46 90096 900146 90046 90096 900146 90046 90096 900146 90046 90096 900146 90046 90096 900146 900196 900 | 4.671 174.986 325.167 024.671 174.986 325.167 024.671 174.986 325.167 024.671 174.986 325.167 024.671 174.986 325.167 025.294 24 | -5.636 01-5.338 76-5.130 01-5.636 01-5.338 76-5.130 01-5.636 01-5.338 76-5.130 01-5.636 01-5.338 76-5.130 01-5.636 01-5.338 76-5.130 01-4.776 06 |

Table 6-1（continuation table）

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gas supply pressure*Ps*(MPa) | Flow measurement *M* ′(m3/h) | Flow correction value *M* (m3/s) × 10-4 | Pressure difference Δ*P* (Pa) | lgΔ*P* | lg*M* |
| 0.35 | 0.136 | 0.217 53 | 246 900 | 5.392 52 | -4.662 48 |
| 0.4 | 0.171 | 0.254 85 | 296 900 | 5.472 61 | -4.593 72 |
| 0.45 | 0.202 | 0.284 67 | 346 900 | 5.540 20 | — |

**6.5 Conclusion**

……

# **Chapter 7 Conclusion and Prospect**

The conclusion of the dissertation is arranged separately as the last chapter of the main body of the paper.

The conclusion is a summary of the main results of the whole paper. In the conclusion, we should clearly point out the creative achievements or innovative point theory (including new insights and new points of view) of the content of this research should be clearly pointed out, as well as the outlook and conception of further research work in the direction of this research in the future, and the conclusion should not be written as an abstract of the paper. The content of the conclusion is generally less than 2000 words.

# **References**

1. 毛峡.绘画的音乐表现[A]. 中国人工智能学会2001年全国学术年会论文集 [C]. 北京：北京邮电大学出版社,2001:739-740
2. 张和生．地质力学系统理论[D]．太原：太原理工大学, 1998
3. 毛峡,丁玉宽．图像的情感特征分析及其和谐感评价[J]. 电子学, 2001,29(12A): 1923- 1927
4. Quagliano L G, Nather H. Up conversion of luminescence via deep centers in high purity GaAs and GaAlAs epitaxial layers[J]. Applied Physics Letters, 1984, 45(5):555.
5. Quagliano L G, Nather H. Up conversion of luminescence via deep centers in high purity GaAs and GaAlAs epitaxial layers[J]. Applied Physics Letters, 1984, 45(5):555.

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# **Theses and other publications during the master's degree program**

**1. Published academic papers**

1. ×××，×××. 部多孔质气体静压轴向轴承静态特性的数值求解[J]．摩 擦学学报，2007 ，38(12) :68~72(EI 收录号： 071510544816)

**2. Patents applied for and obtained (this need not be listed in the absence of patents)**

1. ×××，×××. 一种温热外敷药制备方案：中国，88105607.3[P]. 1989-07-26.

**3. Science and technology awards (not listed when no award is awarded)**

1. ×××，×××. ××静载下预应力混凝土房屋结构设计统一理论. 黑龙江省科学技术二等奖, 2007.

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**Acknowledgement**

I sincerely thank my mentor, Professor XXX, for his meticulous guidance. His words and deeds will benefit me all my life.

Thank you, Professor XXX, and all the teachers and students in the laboratory for their enthusiastic help and support!

Thank you for your financial support for this project.

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