

## 安定で柔らかい磁気浮上システムの構成

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| 著者    | 松村 文夫   |
| 著者別表示 | Matsumura Fumio   |
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# 1995 Fiscal Year Final Research Report Summary

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## Organization of Stable Magnetic Suspension System with High Compliance

Research Project

### Project/Area Number

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06452252

### Research Category

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Grant-in-Aid for General Scientific Research (B)

### Allocation Type

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Single-year Grants

### Research Field

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計測・制御工学

### Research Institution

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Kanazawa University

### Principal Investigator

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**MATSUMURA Fumio** Kanazawa University, Faculty of Engineering, Professor, 工学部, 教授 (40019724)

### Co-Investigator(Kenkyū-buntansha)

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NAMERIKAWA Toru Kanazawa University, Faculty of Engineering, Research Associate, 工学部, 助手 (30262554)

IWAHARA Masayoshi Kanazawa University, Faculty of Engineering, Associate Professor, 工学部, 助教授 (80020212)

YAMADA Sotoshi Kanazawa University, Faculty of Engineering, Professor, 工学部, 教授 (80019786)

### Project Period (FY)

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1994 – 1995

### Keywords

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magnetic levitation / magnetic suspension / magnetic bearing / feedback control / nonlinear control / electromagnetic actuator / permanent magnet

### Research Abstract

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(1) Studies of Nonlinear Control Magnetic Suspension

A magnetic suspension system by means of nonlinear control was designed and constructed. The compliance of the magnetic suspension system was measured. More high compliance system was obtained comparing with a linear control system. In an integral type control system, steady state characteristics is good.

However, there are difficulty to insure the atability.

Other several nonlinear control methods were designed and compared.

(2) Study of Single-Axis Repulsive Type Magnetic Bearing

A magnetic bearing system whose radial motions are restrained by permanent magnets and axial motion is controlled by an electromagnet was designed and constructed.

High compliance magnetic bearing system was obtained. However, a whirling motion is occured. It is desirable to study to control the whirling motion by use of a few electromagnets.

(3) General Techniques for Magnetic Suspension

In order to assist the above studies, the following items were studied. · Investigation of techniqes of magnetic suspension. · Application of Hinfinity control theory. · Experiments for the practical use of magnetic bearings

## Research Products (14 results)

All Other

All Publications (14 results)

[Publications] F.Matsumura.: "Elimination of Unbalance Vibration in AMB Systems using Gain Scheduled H $\infty$  Robust Controllers" Proc.of 4th International Symposium on Magnetic Bearings. 4. 113-118 (1994) ▼

[Publications] 松村 文夫: "磁気軸受とその関連技術I.制御形磁気軸受とその応用" 電気学会論文誌D. 114-D. 1200-1207 (1994) ▼

[Publications] M.Fujita: " $\mu$ -Synthesis of an Electromagnetic Suspension Systems" Trans.of IEEE on Automatic Control. 40. 530-536 (1995) ▼

[Publications] 松村 文夫: "柔らかい磁気浮上システム構成の試み" 日本AEM学会誌. 3. 30-33 (1995) ▼

[Publications] T.Namerikawa: "Application of Gain Scheduled H $\infty$  Robust Controlles to a Magnetic Bearing" Proc.of International Power Electronics Conference. 1340-1345 (1995) ▼

[Publications] 大路 貴久: "永久磁石反発型1軸制御磁気軸受の構成" 日本AEM学会誌. (掲載決定). (1996) ▼

[Publications] 岡田 養二: "磁気軸受の基礎と応用" 養賢堂, 192 (1995) ▼

[Publications] F.Matsumura: "Elimination of Unbalance Vibration in AMB Systems using Gain Scheduled H\* Robust Controllers." Proc. of 4th International Symposium on Magnetic Bearings. 4. 113-118 (1994) ▼

[Publications] F.Matsumura: "Magnetic Bearings and its Related Techniques. I.Control Type Magnetic Bearings and its Applications." Trans. of IEE Japan. vol.114-D. 1200-1207 (1994) ▼

[Publications] M.Fujita: " $\mu$ -Synthesis of an Electromagnetic Suspension System." Trans. of IEEE on Automatic Control. vol.40. 530-536 (1995) ▼

[Publications] F.Matsumura: "Experiments of High Compliance Magnetic Suspension System." Jour. of the Japan Society of Applied Electromagnetics. vol.3. 30-33 (1995) ▼

[Publications] T.Namerikawa: "Aplication of Gain Scheduled H\* Robust Controllers to a magnetic Bearing." Proc. of the International Power Electronics Conference. 1340-1345 (1995) ▼

[Publications] T.Ohji: "Single-Axis Controlled Repulsion Type Magnetic Bearing System using Permanent Magnet." Jour. of the Japan Society of Applied Electromagnetics. (to be appeared). (1996) ▼

[Publications] Y.Okada: Fundamentals and Applications of Magnetic Bearing.Yokendo, 1-192 (1996) ▼

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