Examination on Effectiveness of H-infinity Control Theory Using Experiments of Flexible Beam Magnetic Suspension

1991 Fiscal Year Final Research Report Summary

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Research Project

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02452179

Research Category

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Allocation Type

Single-year Grants

Research Field

計測・制御工学

Research Institution

Kanazawa University

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H-Infinity Control / Robust Control / Magnetic Suspension / Magnetic Levitation / Magnetic Bearing / Digital Contorl / Flexible Beam

Research Abstract

In many magnetic levitation or suspension systems such as magnetically levitated train, magneticallynetic levitation or suspension suspended carrier, and magnetic bearing, a problem of mechanical vibration is important. Because uncertainties of modelling on controlled system affect severely the closed control system when high performances such as high speed operation or robustness against disturbance are investigated. On the other hand, H-infinity control theory-is being watched from viewpoint of robustness. Then, effectiveness of H-infinity control theory is examined in this research using experiments of flexible beam magnetic suspension.
In this research, two types of flexible beam magnetic suspension system and their instrument and control system are set up, in which FFT analyzer, impact hammer, oscilloscope, digital signal processor(DSP), personal computer, and DA/AD converter are used. Several designs of control system using H-infinity

theory are made and experiments are carried out successfully.
In these results, effectiveness of H-infinity control theory to the system design is demonstrated. Moreover, fundamental knowledge on frequency weighting function are obtained.

Research Products (24 results)

All | Other

All | Publications (24 results)

[Publications] 藤田 政之: "磁気浮上システムのH^∞制御" 電気学会雑誌. 110. 661-664 (1990)

[Publications] 松村 文夫: "H^∞制御理論を適用したロバストな磁気浮上系" 電気学会論文誌. 110ーD. 1051-1057 (1990)

[Publications] M.Fujita: "Experiments of the H^∞ Disturbance Attenuation Control of a Magnetic Suspension Systems" Proc.29th IEEE Conf.Dicision & Control. 2773-2778 (1990)

[Publications] F.Matsumura: "Modeling and Control of Magnetic Bearing Systems Achieving a Rotation Around the Axis of Inertia" Proc.2nd Int.Symp.on Magnetic Bearing. 273-280 (1990)

[Publications] M,Fujita: "H^∞ Robust Control Design for Magnetic Suspension System" Proc.2nd Int.Symp.on Magnetic Bearing. 349-356 (1990)

[Publications] F,Matsumura: "An Observer-Based Robust Stabilization of 3-axes Controlled Type Magnetic Bearings Using a Digital Signal Processor" Proc.11th IFAC World Congress. 8. 80-85 (1990)

[Publications] 松村 文夫: "実用化が始まった磁気軸受ー新しい構想の非接触ベアリングー" 電気学会雑誌. 111. 219-222 (1991)

[Publications] 藤田 政之: "柔軟ビ-ム磁気浮上システムのH^∞ロバスト制御" 計測と制御. 30. 706-711 (1991)

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[Publications] M. Fujita, F. Matsumura: "H^* Control of A Magnetic Suspension System" Journal of IEE of Japan. 110-8. 661-664 (1990)

[Publications] F. Matsumura, M. Shimizu: "Robust Stabilization of a Magnetic Suspension System Using H^* Control Theory" Trans. of IEE of Japan. 110D-10. 1051-1057 (1990)

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[Publications] F. Matsumura, M. Fujita, K. Okawa: "Modeling and control of Magnetic Bearing Systems Achieving a Rotation Around the Axis of Inertia" Proc. 2nd Int. Symp. on Magnetic Bearing. 273-280 (1990)

[Publications] M. Fujita, F. Matsumura, M. Shimizu: "H^* Robust Control Design for Magnetic Suspension System" Proc. 2nd Int. Symp. on Magnetic Bearing. 349-356 (1990)

[Publications] F. Matsumura, M. Fujita, H. Takahashi: "An Observer-Based Robust Stabilization of 3-axes Controlled Type Magnetic Bearings Using a Digital Signal Processor" Proc. 11th IFAC World Congress. 8. 80-85 (1990)

[Publications] F. Matsumura: "Practical Use of Magnetic Bearing Has Started - Non-contact Bearing of New concept -" Journal of IEE of Japan. 111-3. 219-222 (1991)

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[Publications] M. Fujita, F. Matsumura, K. Uchida: "Experimental Evaluation of H^* Control for a Flexible Beam Magnetic Suspension System" Proc. Int. Workshop Robust Control. (1991)

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