Application of Computer Measurement and Control of Aerodynamic System of Aluminum Fan Blade

ICTU Student 200
Thai Nguyen University of Information and Communication Technology
Thai Nguyen University, Thai Nguyen, Vietnam
student200@ictu.edu.vn

***Abstract*—This thesis focuses on the application of computer measurement and control in the aerodynamic system of an aluminum fan blade. It covers signal conversion methods, system identification and synthesis, and the development of a control software using Visual Basic. The research includes the design and integration of a measurement and control system for the aerodynamic system, and the implementation of control algorithms such as PI and PID. The study explores various signal conversion techniques, including analog-to-digital and digital-to-analog conversion, and their applications in the measurement and control of an aluminum fan blade's aerodynamic system. The Takahashi system identification method was successfully applied to the aerodynamic system, providing a basis for further research and potential improvements. The software was able to accurately control the angle of the fan blade according to user-defined settings, demonstrating the feasibility and effectiveness of the application.**

***Index Terms*—signal conversion, system identification, control algorithms, Visual Basic, PCI-AT-MIO-16XE, fan blade**

I. Introduction

The thesis delves into the principles of measurement and control, focusing on signal conversion techniques, such as analog-to-digital and digital-to-analog conversion. It also discusses the use of the Takahashi system identification method for the aerodynamic system of an aluminum fan blade. The research aims to design and integrate a measurement and control system for the aerodynamic system, and to implement control algorithms such as PI and PID. The study covers the design and implementation of a control software using Visual Basic, which includes functions for zero adjustment, system identification, system synthesis, and numerical input/output. The limitations include the lack of detailed evaluation of the system's performance and the need for further research to explore alternative methods for measurement and control [1]. Published books on the methods and subject of this project provide context for this English summary [9].

II. Methods

The methods involve the study of signal conversion techniques, the use of a PCI-AT-MIO-16XE card for data acquisition, and the development of a control software using Visual Basic. The software includes functions for zero adjustment, system identification, system synthesis, control algorithms (PI and PID), and numerical input/output. The research covers the design and implementation of a measurement and control system for the aerodynamic system of an aluminum fan blade. The Takahashi system identification method was successfully applied to the aerodynamic system, providing a basis for further research and potential improvements. The limitations include the lack of detailed evaluation of the system's performance and the need for further research to explore alternative methods for measurement and control [1].

Supervisor: ICTU Teacher 134, Thai Nguyen University of Information and Communication Technology.

III. Results

The results demonstrate the successful implementation of the control algorithms (PI and PID) for the aerodynamic system of the aluminum fan blade. The software was able to accurately control the angle of the fan blade according to user-defined settings. The implementation of the Takahashi system identification method was also successful, providing a basis for further research and potential improvements. The limitations include the lack of detailed evaluation of the system's performance and the need for further research to explore alternative methods for measurement and control [1].

IV. Discussion

The discussion highlights the effectiveness of the PI and PID control algorithms in achieving precise control of the fan blade's angle. The Takahashi system identification method was successfully applied to the aerodynamic system, providing a basis for further research and potential improvements. The limitations include the lack of detailed evaluation of the system's performance and the need for further research to explore alternative methods for measurement and control [1].

V. Conclusion

The thesis concludes that the application of computer measurement and control in the aerodynamic system of an aluminum fan blade is feasible and effective. Future work could explore alternative methods for measurement and control, and the application of the Takahashi method to other industrial systems. The limitations include the lack of detailed evaluation of the system's performance and the need for further research to explore alternative methods for measurement and control [1].

References

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