Finite Element Formulation and Response of Rotation Systems

葉承修、洪振義

E-mail: 8701428@mail.dyu.edu.tw

ABSTRACT

The subject of the this article is to create a flexible arithmetical system which is the extension of「Finite Element Formulation and Analysis of Rotating Systems」,and we use this system to assist the building of mathematical model of rotation elements. And also studying that under a rotating conservative system, what is the dynamic characteristics of a rotator in constant velocity or various velocity. Then we can use the results to compute the response of the rotator under a certain loading, and understand the behavior of the rotation mechanism. Besides, we also analyze the copmuting of linear and nonlinear, and getting to know what's the difference between real mode and authority. Making vibration analysis, the most important thing is to derive the controlling equation.Inthis article,we first use Hamilton theory to derive the equation,then apply "Finite Element Formulation" to manipulate the controlling equation of the system. As a result, we got a FORTRAN equation for VAX computersystem,then we can use the equation to compute the displacement and loading of every nodes in the mechanism. The beam element model in this survey is in a 3-dimensional coordinate system, cross section has two nodes and a reference point. Each nodes has three displacements and three rotating deflection, and can bear the effects of angle velocity and angle accelerator. So through proper combination, the beam elements can be used to model rotating axis、rotating leaves、and crankshaft Finite Element Formulation. Furthermore, by the assistant of symbol arithmetical software, we can compute the coefficient of the controlling equation skillfully, and then transfer the equation to the form of program languages, to shorten the time of progrqmming and prevent the computing mistakes that we might make.

Keywords : 0

Table of Contents

REFERENCES

1. Przemieniecki,J. S. , "Theory of Matrix Structural Analysis",城大書局印行(1968) 2. Chandrupatla,T. R. , Belegundu,A. D."Introduction to Finite Elements in Engineering",Prentice-Hall-New Jersey (1991) 3. Straub,F. K. , Hamilton B. K. , "Theory Manual for Element Library of 2GCHAS",McDonnell Douglas Helicopter Company Mesa Arizona (1990) 4. Huseyin, K. , "Vibrations and Stability of Multiple Parameter System",Noordhoff International Publishing (1978) 5. Nelson, H. D. and McVaugh, J. M. ,"The Dynamics of Rotor Bearing System Using finite Element", Journal of engineering for Industry,pp593-600.(1976) 6. Jialiu Gu, "An improved Transfer Matrix-Direct Integration Method for Rotor Dynamics",Journal of Vibration, Acoustics,Stress,and Reliability in design, Vol.108 ,pp182-188 (1986) 7. Ting Noung shiau and Jon Li Hwang, "A New Approach to the Dynamics Characteristic of Undamped Rotor-Bearing Systems",Journal of Vibration, Acoustics, Stress, and Reliability in

Design, Vol.111 ,pp379-385 (1986) 8. 施光宇, "應用有限元素法於轉子之分析",私立大業大學碩士論文 (1995)