

الآية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

يَا أَيُّهَا

النَّاسُ اتَّقُوا رَبَّكُمْ

إِنَّ زَلْزَلَةَ السَّاعَةِ شَيْءٌ عَظِيمٌ

﴿1﴾ يَوْمَ تَرُؤْنَهَا تَذْهَلُ كُلُّ مُرْضِعَةٍ

عَمَّا أَرْضَعَتْ وَتَضَعُ كُلُّ ذَاتِ حَمْلٍ حَمْلَهَا وَتَرَى

النَّاسَ سُكَارَى وَمَا هُمْ بِسُكَارَى وَلَكِنَّ عَذَابَ اللَّهِ

شَدِيدٌ ﴿2﴾ () وَمِنَ النَّاسِ مَنْ يُجَادِلُ فِي اللَّهِ بِغَيْرِ

عِلْمٍ وَتَتَّبِعُ كُلَّ شَيْطَانٍ مَرِيدٍ ﴿3﴾ كَتَبَ عَلَيْهِ

أَنَّهُ مِّنْ تَوَلَّاهُ فَإِنَّهُ يَضِلُّ وَيَهْدِيهِ

إِلَىٰ عَذَابِ السَّعِيرِ

﴿4﴾

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DEDICATION

To my dearest Mother May her soul rest in
peace at place better

I dedicate this humble work

Abstract

Industries worldwide are rapidly developing advanced complex machinery. One area that must be considered in these engineering systems is the rotating machines torsional vibrations. Hence it can lead to early failure and continuous downtime and .then expensive repairs to machinery if neglected or not considered

The torsional vibrations are a type of severe twisting motion due to improper designed rotation machinery. It usually causes noticeable sound disturbances and .potential fatigue problems

The main objective of this study is to write a program that can analyze torsional vibration in the primary design stages of the rotating machines. the MATLAB program had been used to write this program. This study involves introduction to the analysis of torsional vibrations in rotating mechanisms and the benefits of vibration analysis in addition to that a models to simulates the rotating mechanisms had been designed and manufactured and its mathematical equations been written, and been analyzed using Newton's laws of motion and method of Holzer and two on the basis of which was built analysis software. And also some more information on the experiments conducted to analyze the vibrations using (Microlog CMVA 60 data collector analyzer) to make sure of the validity of the program. This study also shows comparisons between the analytical results and the results of a measurement. Comparing the results we found that the differences between the results of the . (experiments and the MATLAB program (about 41.95%

Finally, which we found that the program is designed to be valid for the analysis .of torsional vibrations in rotating machines

التجريد:

في جميع أنحاء العالم تتطور الصناعات بسرعة الآلات المعقدة المتقدمة. وأحد المجالات التي يجب أن ينظر في هذه النظم الهندسية هي الاهتزازات الإلتوائية للآلات الدوارة. إذ لم تكن الاهتزازات الإلتوائية في الاعتبار فإنها قد تؤدي إلى فشل في وقت مبكر وتوقف مستمر وإلى إصلاحات مكلفة للآلات.

الاهتزازات الإلتوائية هي نوع من حركة التواء حاد نتيجة لدوران الآلات المصممة بطريقة غير سليمة. فإنه يتسبب عادة في اضطرابات صوت ملحوظ ومشاكل التعب المحتملة.

والهدف الرئيسي من هذه الدراسة هو بناء برنامج لتحليل الاهتزازات الإلتوائية في مراحل التصميم الأولية للآلات الدوارة. وتم استخدام الماتلاب لكتابة هذا البرنامج. وقد اشتملت الدراسة علي مقدمة عن تحليل الاهتزازات الإلتوائية في الآليات الدوارة وفوائد تحليل الاهتزازات. و قد تم تصميم وتصنيع نموذج يحاكي الآليات الدوارة ووضعت له معادلات رياضية تم تحليلها باستخدام قوانين نيوتن للحركة وطريقة هولزر وهما علي أساسهما تم بناء برامج التحليل. وأيضاً أجريت علي النموذج تجارب لتحليل الاهتزازات باستخدام جهاز (Microlog CMVA 60) للتأكد من صلاحية البرنامج. وتبين هذه الدراسة أيضاً مقارنات بين النتائج التحليلية ونتائج القياس. وبمقارنة النتائج وجدنا أن الفروق بين نتائج التجربة وبرنامج MATLAB (حوالي 41.95%).

أخيراً وجدنا أن البرنامج المصمم يكون صالحاً لتحليل الاهتزازات الإلتوائية في الآليات الدوارة.

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List of Symbols

Units	Description	Symbol
Gpa	,modulus of rigidity for shaft material	G
m ⁴	Second moment of area about the axis of rotation	J
m	.Length of shaft	L
kg	Mass Disk	M
kg	Eccentricity of Mass Disk	m
m	Eccentricity of mass center of Disk	r
kg.m ²	moment of inertia of the Disk	Id
kw	Power in put	P
rpm	Rotational Speed	N
KN.m	Electrical Motor output torque	T _{motor}
Kw	Electrical Motor output Power	P _{motor}
KN.m	Rotor t torque input	T _{Rotor}
Kw	Rotor Power input	P _{Rotor}
Rad/sec	Natural Frequency	wn
Nm/rad	Torsional Stiffness coefficient	K
rad/sec	Angular displacements	θ
rad/sec ²	Angular Acceleration	
rad/sec	Amplitude displacements	φ
sec	Simple Time	t
	Horse Power	HP
	Revaluation Per Mint	RPM
		CMVA60
	Fast Fourier Transform	FFT
		PRISM ⁴
	Data Acquisition Devices	DADs
		RAM
	Non Drive End Bearing	NDEB
	Drive End Bearing	DEB

