ROTORDYNAMICS IN ALTERNATIVE ENERGY POWER GENERATION

A thesis presented in fulfilment of the

requirements for the degree of

Master of Engineering

In

Mechatronics

at

Massey University

Albany, Auckland, New Zealand

Ivan Cortes-Zambrano

2011

Abstract

This thesis analyses and discusses the main alternative energy systems that work with rotordynamics machines to generate power. Hydropower systems, wave and ocean energy, geothermal, gas turbines, wind power, tidal energy and biofuels are the most important systems that use rotating shafts to generate power.

Descriptions of the principles of vibration follow with analysis of rotordynamics. The Jeff rotor, fluid film bearings and magnetic bearings are explained.

The protection of the environment is one of the most important features of renewable energy and biofuel is a crucial area. Fossil fuels are a limited resource and burning them contributes to carbon dioxide levels with catastrophic effects for the atmosphere. This thesis analyses the biofuels process in electricity generation and overviews the topic of biofuels for transport.

The undesirable effects of pollution from burning fossil fuels, an increase in international petroleum prices as well as the risk of using nuclear power have combined effects that illustrate the importance of research in this area.

CONTENTS

List of Figures

List of Tables