## An Investigation of Energy Harvesting Using Macro Fiber Composites

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#### **ABSTRACT**

Energy harvesting (also known as power harvesting or energy scavenging) is the process by which energy is derived from external sources (e.g., solar power, thermal energy, wind energy, salinity gradients, [citation needed] and kinetic energy), captured, and stored for small, wireless autonomous devices, like those used in wearable electronics and wireless sensor networks. One of the most promising techniques is piezoelectric energy harvesting where strain produced by different means is directly converted to electrical charge via direct piezoelectric effect. The purpose of this study is to develop a technique optimizing the energy harvest of Macro Fiber Composites (MFC) cantilever beam with an end mass system. The equation of motion of cantilever beam with an end mass is derived and the amplified effect of end mass in strain distribution of cantilever beam is also carefully investigated. The efficiency of MFC energy harvesting system with different length of MFC is simulated numerically. With end mass/beam mass ratio equals to 2.0, the study found the system with 60% covered with MFC is 10% more efficient compared to the system with fully covered. The developed numerical techniques provide an invaluable tool for the designing and predicting the MFC energy harvesting system performance which can be in turn be used in many applications.

Keywords: Piezoelectric energy harvesting, Vibration mode, The cantilever beam.

#### Table of Contents

第一章 緒論 1.1 ,研	开究背景11.2	,壓電材料的特性	3 1.2.1 壓電原
理	3 1.2.2, 極化處理	4 1.2.3 介電效應	5
1.2.4 電焦效應	6 1.2.5 平行板電容	§7 1.3 ,研究	泪
的	8 1.4 研究方法	8 第二章 壓電能量擷取器系	統 2.1 壓電能量擷取
介面電路	92.2 壓電能量擷取模型	102.3 壓電致動器模	
型	12 2.3.1 壓電致動器型式	13 2.3.2 壓電材料能量擷耳	以應用之研
究17	2.3.3 壓電能量轉換效率之研究	18 第三章 樑受垂直力振動分	介析 3.1 樑的自由振動
分析	22 3.1.2 樑的運動方程式解	25 3.2 樑的自由振動加	上末端質量運動方程
式28 3.3	應變能轉換成電能	32 第四章 壓電振動能量擷取模擬:	分析 4.1 ,壓電振動能
分析	35 4.1.1 懸臂樑的模態	38 4.1.2 懸臂樑的應	
變	39 4.1.3 懸臂樑轉換的電壓	40 4.2 壓電振動能擷取:	最佳化研
究	41 4.3 結論	. 45 第五章 總結與未來工作 5.1 總	
結	47 5.2 未來工作	47 參考文獻	
49			

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