**Title:** Energy Harvesting Using Cylindrical Piezoelectric Transducers

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The dissertation is focused on the use of cylindrical piezoelectric transducers to harvest the energy of mechanical and aerodynamic vibrations. The dissertation contains in 123 pages. The first chapter has presented a background of piezoelectricity and the fundamentals governing its physics, as well as a review of the literature written on the topic. Chapter Two has presented the physical and electrical characteristics of the cylindrical piezoelectric transducers understudy. Chapter Three has presented measurements to quantify the electrical impedance of the cylinders. Chapter Four has presented the research on the use of transducers to harvest acoustic waves. Chapter Five has presented the research on the use of the transducers to harvest the energy of Flow-Induced Vibrations, FIV. Finally, Chapter Six has concluded the results of the work.

The research on harvesting the energy of both acoustic and FIV has followed an experimental approach. It used open-circuit measurements followed by closed-circuit measurements to find the optimum harvesting conditions. Regarding harvesting acoustic waves, it was possible to construct an energy harvester that harvests the energy from mono-frequency sound waves. As compared to other harvesters presented in the literature, the harvester was able to harvest the energy efficiently both loss-wise and volume-wise. Regarding the harvesting of FIV, the open-circuit measurements have studied the correlation between the characteristics of the flow phenomena involved in the process and the characteristics of the generated electric signals, which lays the ground for the use of the mentioned transducers as pressure sensors. Moreover, the closed-circuit measurements were used to measure the cylinders' ability to harvest the energy as energy harvesters.

The uniqueness of this research is that it has focused on the role of the geometry of the piezoelectric transducer in interaction with the environment. In doing so, it has discussed this effect in different forms of energy harvesting, acoustic and FIV. Therefore, the research helps raise the efficiency of energy harvesters used for micro-electro-mechanical applications. Moreover, it helps develop new concepts for pressure sensors for flow-measurement applications.

The obtained results were published in the framework of international conferences and also in two impact journals registered in Q1 and Q3. On the basis of publication, the works have also been cited several times. **I recommend the submitted doctoral thesis for defense.**

In Liberec

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