

Abstract:

The objective of this thesis is to show that it is possible to harvest the mechanical energy from waves using electroactive polymers. We will study a device of tubes composed of dielectric elastomers associated with merchant navy ships. The challenge will be to create a device that can be installed on any ship, even after its construction. We will then imagine a system composed of three layers of fully deformable materials. An "active" layer of electroactive polymer will be placed between two layers of electrodes made of carbon conductive grease. The choice of the electroactive polymer will be based on the silicone family, more specifically, on Sylgard 184. However, a mix of several dielectric elastomers seems to be the best choice. This system will be protected and wrapped by a chlorosulfonated polyethylene tube. The shape and position of the tube will be discussed. Indeed, limiting factors in real conditions of use will arise. Such as the stability of the vessel or the hydrodynamism. We have also calculated theoretically the energy harvesting capacity of this system according to its deformation. As well as its cost and the economic efficiency that it proposes. All these theoretical results are promising.

Keywords: Harvest, Mechanical energy, Waves, Ships, Merchant navy, Electroactive polymer, Dielectric elastomer, Stability, Hydrodynamism, Energy harvesting, Economic efficiency.