

NAME: ABOBDA THÉODORE LEJUSTE (24 APRIL 2015).

TITLE: A MODEL OF ARTIFICIAL HEART BASED ON FERROMAGNETIC MASS ACTUATED BY AN ELECTROMAGNET.

Abstract:

In this work a preliminary study is performed in order to propose a new approach to tackle the increasing demand of heart transplant by the use of artificial heart. One solution is developed taking as basis a ferromagnetic mass fixed on a spring and subjected to an electromagnet under variable current. Two derivations of the device are done to obtain left ventricular assist device and biventricular assist device or total artificial heart. As results, both devices exhibit sub harmonic oscillations that can be used to pump blood and present an intrinsic instability; an efficient approach to control the instability is presented. Furthermore, the interest of the device is based on translation movement allowing the pumping function in all directions; blood flow frequency servo-control to adapt pumping function of the left ventricular assist device to body needs; unstationary flow induced by blood flow frequency servo-control and the possibility to obtain heartbeat like pumping function with induced bursting in the pump.

Keywords: Ferromagnetic mass; Electromagnet; Bursting oscillations; Pull-in; frequency servo-control; Artificial heart; Biventricular assist device; Left ventricular assist device.