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Tesis: **"BOUNDARY CONTROL OF CONTINUUM ROBOT FOR DYNAMIC SCANNING TASK"**

Resumen:

The usage of continuum robot techniques is becoming more and more popular in medical applications, specially for minimally invasive chirurgical procedures. Some of these procedures may include, for example, brain, cardiac, and vascular surgeries, optical coherence tomography (OCT), among others.

This work presents a port Hamiltonian system (PHS) approach for a 5cm long optical fiber continuum robot actuated by a 3cm long PT230.94 piezoelectric tube. The purpose of the robot is to effectuate micro-scanning tasks. A non-linear infinite dimensional PHS model of the 3D continuum robot was obtained from the Cosserat rod dynamical equations also shown in this work. A compar-ison of the rod's behavior of the rod was made using the two different models, obtaining a similar response. Also, physical parameters of the optical fiber robot and the piezoelectric tube actuator were identified with an experimental setup in the AS2M department at Femto-st institute. Then an energy-based interconnection damping assigment passivity based control (IDA-PBC) is synthesised as a boundary controller to control a desired scanning trajectory of the robot's free end. The controller is first simulated by giving an [x, y] desired position and then a desired 2D spiral scanning trajectory. The experimental part was then validatedin the x direction with a desired end point and with a desired trajectory.