

Identification and Force Control of a Two Chambers Pneumatic Soft Actuator

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Abstract : Researches in soft actuators are now growing rapidly because of their adequacy to be applied in sectors like medical, agriculture, biological and welfare. This paper presents system identification (SI) and control of the force generated by a two chambers pneumatic soft actuator (PSA). A force mathematical model for the actuator was identified experimentally using data acquisition card and MATLAB SI toolbox. Two control techniques; a predictive functional control (PFC) and conventional proportional integral and derivative (PID) schemes are proposed and compared based on the identified model for the soft actuator flexible mechanism. Results of this study showed that both of the proposed controllers ensure accurate tracking when the closed loop system was tested with the step, sinusoidal and multi step reference input through MATLAB simulation although the PFC provides a better response than the PID.

Keywords : predictive functional control (PFC), proportional integral and derivative (PID), soft actuator, system identification

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