

Nonlinear mathematical model of an Intelligent Pneumatic Actuator (IPA) systems: Position and force controls

Abstract :

This paper presents a nonlinear mathematical modeling of an Intelligent Pneumatic Actuator (IPA) systems and comparison of simulation results with existing experimental results of position and force control data. The derivation method of mathematical equation is referred and reviewed from several literatures. From the mathematical modeling, a simulation analysis was done and compared with existing data from previous research. This paper proposed a reverse engineering method from existing real system on the intelligent actuator that focused more on development of hardware and experimental setup to simulation analysis for validation of the developed model. The simulation results show the affirmation of the developed model based on the mathematical derivation work. The simulation results demonstrate the open-loop and close-loop control systems of position and force tracking control. Finally, performance of this system are analyzed and compared. For future research, this simulation can be used for development of new controllers, validation process and can be applied to real system.