

عنوان مقاله:

Hysteresis Modeling, Identification and Fuzzy PID Control of SMA Wire Actuators Using Generalized Prandtl-Ishlinskii Model with Experimental Validation

محل انتشار:

مجله مکانیک کاربردی محاسباتی، دوره 50، شماره 2 (سال: 1398)

تعداد صفحات اصل مقاله: 12

نویسندگان:

Hamid Basaeri - *Department of Mechanical Engineering, University of Utah, Salt Lake City, Utah, USA*

Mohamadreza Zakerzadeh - *School of Mechanical Engineering, College of Engineering, University of Tehran, Tehran, Iran*

Aghil Yousefikoma - *Center of Advanced Systems and Technologies (CAST), School of Mechanical Engineering, College of Engineering, University of Tehran, Tehran, Iran*

Nafise Faridi Rad - *Department of Mechanical Engineering, University of British Columbia, Vancouver, British Columbia, Canada*

خلاصه مقاله:

In this paper, hysteretic behavior modeling, system identification and control of a mechanism that is actuated by shape memory alloy (SMA) wires are presented. The mechanism consists of two airfoil plates and the rotation angle between these plates can be changed by SMA wire actuators. This mechanism is used to identify the unknown parameters of a hysteresis model. Prandtl-Ishlinskii method is employed to model the hysteresis behavior of SMA actuators, and then, a self-tuning fuzzy-PID controller is designed based on the obtained model and implemented experimentally on the mechanism. The process of designing the controller has been implemented based on the model which results in compensating time and price. Self-tuning fuzzy-PID controller is applied to the closed control loop in order to control the position of the morphing wing. The performance of the controller has been investigated under different input signals including square and sinusoidal waves, and the results show the proper effectiveness of the method.

کلمات کلیدی:

Hysteresis Modeling, Fuzzy-PID Control, SMA Actuator

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1031967>

