Meeting: 1006, Lubbock, Texas, SS 11A, Special Session on Future Directions in Mathematical Systems and Control Theory

1006-46-61 **Ram V. Iyer*** (rvenkata@math.ttu.edu), Boston and Broadway, Rm 224, Lubbock, TX 79409, **Xiaobo Tan** (xtan@egr.msu.edu), Dept. of Electrical & Computer Engineering, 2120 Engineering Building, East Lansing, MI 48824, and **P. S. Krishnaprasad** (krishna@glue.umd.edu), A.V. Williams Bldg, Institute for Systems Research, College Park, MD 20742. *Approximate Inversion of the Preisach Hysteresis Operator with Application to Control of Smart Actuators.*

Hysteresis poses a challenge for control of smart actuators. A fundamental approach to hysteresis control is inverse compensation. For practical implementation, it is desirable for the input function generated via inversion to have regularity properties stronger than continuity. We consider the problem of constructing right inverses for the Preisach model for hysteresis. Under mild conditions on the density function, we show the existence and weak-star continuity of the right-inverse, when the Preisach operator is considered to act on Hölder continuous functions. Next, we introduce the concept of regularization to study the properties of approximate inverse schemes for the Preisach operator. Then, we present the Fixed Point and Closest-Match algorithms for approximately inverting the Preisach operator. Results on the convergence and continuity properties of these two numerical schemes will be presented. Finally, we present the results of an open-loop trajectory tracking experiment for a magnetostrictive actuator. (Received February 01, 2005)