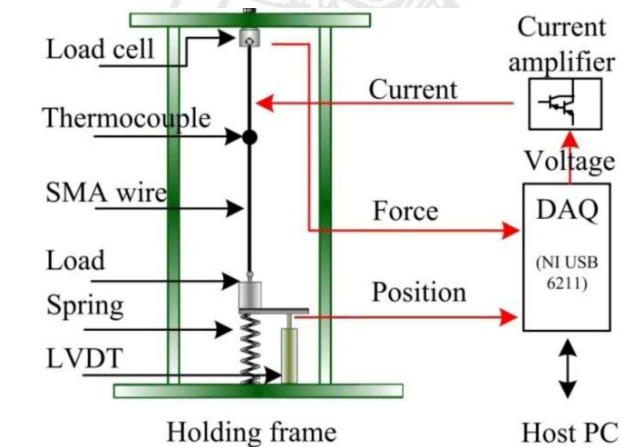# Self-sensing of shape memory alloys

Problem: shape memory alloys (SMA) display electrical resistance variation during phase transformation: this property allows to link the resistance variation to strain and therefore to have a feedback on SMA motion without the need of a strain transducer. Such property can be applied for actuation control purposes or for SMA appliances monitoring.

Objective: understanding self-sensing technology and reproducing it in laboratory; monitoring of SMA resistance during shape-setting heat treatment.
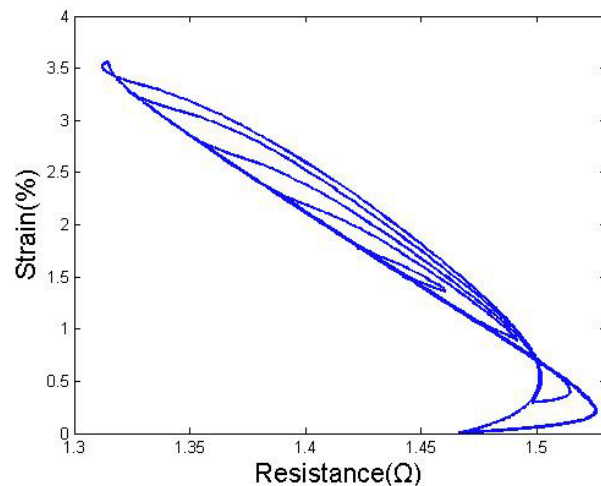

Type: Literature review / Experimental

Prerequisites for experimental part:

➢ Basic knowledge of Matlab

References

• Wang, T.-M., Shi, Z.-Y., Liu, D., Ma, C., Zhang, Z.-H. *An accurately controlled antagonistic shape memory alloy actuator with self-sensing* (2012) Sensors (Switzerland), 12 (6), pp. 7682-7700.

• V. Antonucci, G. Faiella, M. Giordano, F. Mennella, L. *Electrical resistivity study and characterization during NiTi phase transformations* (2007) Thermochimica Acta 462: 64–69

• Zhang, J.-J., Yin, Y.-H., Zhu, J.-Y. *Electrical resistivity-based study of self-sensing properties for shape memory alloy-actuated artificial muscle* (2013) Sensors (Switzerland), 13 (10), pp. 12958-12974.

Thesis proposal