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Activation strategies and their impact on the lifetime of SMA

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Shape memory alloys have the astonishing ability to remember a previous imprinted shape after deformation. Moreover, the electrical resistance is suitable for position control and prediction of fatigue of the SMA-based actuator system. Due to their advantageous properties, SMA actuators are interesting for many applications, especially if high workload, low weight, electromagnetic compatibility or integration of functions is required. Despite their advantages, the potential applications of shape memory alloys are often limited by their lifetime. Along with structural factors, the life of SMA-based actuator systems is determined by functional factors. This includes displacements, cycles, load, ambient temperature, type of connection method but also control. In industrial applications often, reason for premature failure or the limited lifetime is the wrong operation of SMA-based actuator systems. In this context, proper activation is crucial.

Therefore, focus of this paper is analyzing the activation of SMA actuators. First, an overview of possible strategies for activation is given and inPSMencing factors regarding the activation of SMA actuators are discussed. Based on this, activation strategies and important factors like activation time and current are investigated using design of experiments. With design of experiments, it is possible to investigate important factors in-depth. The results will be discussed in terms of their impact on the lifetime of SMA actuators.

Finally, recommendations for proper operation of SMA actuators are given. Further studies should be done investigating further factors inPSMencing the lifetime of SMA actuators like the impact of control.

Biography

Antonia Bette is research assistant for Chair of Production Systems of the Institute for Product and Service Systems at the Ruhr-University in Bochum, Germany. She completed her Master's degree in 2015. Her current research project regards applications of SMA-based actuator systems in aircraft interiors.

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