Study of the pseudoelastic damping behaviour of the Fe-30Mn-6Si-5Cr shape memory alloy

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ABSTRACT

Since their discovery, Iron based Shape Memory Alloys (Fe-SMA) have attracted much attention of researchers and industrials thanks to their low cost and excellent workability combined to smart properties such as SME (Shape Memory Effect) and damping capacity [1] due to pseudoelasticity [2]. In this paper, the damping capacity of the Fe-30Mn-6Si-5Cr is investigated through pseudoelasticity characterization by cyclic tensile tests using a tensile machine and a Dynamic Mechanical Analyser (DMA). Specimens underwent a specific heat treatment in order to improve their properties.

At ambient temperature, the studied alloy can be found at different microstructures. In order to define the best alloy initial conditions guaranteeing maximum damping capacity, different types of the alloy microstructures were investigated: purely austenitic state and biphased states (austenite + stress induced and/or thermal martensite).

Specimens were studied under different parameters such as vibration frequencies (10^{-1} Hz, 1 Hz and 10 Hz) and strain amplitudes (2% and 4%) at different temperatures.

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