Abstract

Over the last few decades, Shape Memory Alloys (SMAs) have been increasingly explored in order to take advantage of their unique properties (i.e., pseudoelasticity and shape memory effect), in various actuation, sensing and energy absorption applications. As more SMA-based devices are developed, a concurrent study of their behavior in the presence of cracks is needed. In particular, it is of crucial importance to understand the effect of phase transformation on their fracture behavior.

The aim of the present work is to study the effect of stress-induced as well as thermo-mechanically-induced phase transformation on several characteristics of the fracture response of SMAs. An existing phenomenological model, developed within the framework of continuum thermodynamics, is used in conjunction with the finite element method to perform the numerical calculations.