

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Near critical phenomena in amorphous smart materials EDUARD OBERAIGNER, University of Leoben, Institute of Mechanics, MICHAEL FISCHLSCHWEIGER, Materials Center Leoben Forschung GmbH — The importance of smart materials e.g. shape memory alloys (SMAs) for technological applications has been growing during the last 20 years. Especially modeling SMAs behavior has become of high interest in materials science for the prediction of macroscopic effects like pseudoelasticity. The key for their behavior is a displacive solid - solid phase transformation, called martensitic phase transformation. However, such a critical phenomenon requires investigations for deep relations between physical quantities nearby the region of phase transformation. The present study is focusing on a statistical mechanics approach for the description of relations between heat capacity, pseudoelasticity, volume fraction compressibility, alternatively fraction expansion coefficient, and a compressibility tensor, leading to the compliance tensor in the case of elasticity. Also a heat expansion tensor along the line of magnetic phase transitions and transformations has been formulated for shape memory alloys. The work discusses martensitic variants (which occur due to a subgroup relation between the austenitic and martensitic phase) and their asymmetry, which influences the above mentioned quantities as well and gives ideas and suggestions for model improvements.

Eduard Oberaigner
University of Leoben, Institute of Mechanics

Date submitted: 19 Nov 2010

Electronic form version 1.4