Abstract Submitted for the SHOCK05 Meeting of The American Physical Society

Propagation of Macroscopic Phase Boundary in A Finite Rod with Martensitic Transformation under Dynamic Loading¹ WEIWEI XU, ZHIPING TANG, Key Laboratory for Mechanical Behavior and Design of Materials (LMBD), Department of Modern Mechanics, University of Science and Technology of China — Recently, Dai et al[1] studied the propagation of macroscopic phase boundary in a semi- infinitive medium and found some new phenomena. In this article, its propagation along a finite rod is investigated by using a simple mixture model that can describe the mixed phase and reverse transition. Both the shape memory effect (SME) and pseudo-elastic effect (PE) of SMA are considered in the present study. For PE, it is found that under certain loading and boundary conditions, the tension regions can form at different locations of the rod, meaning it may initiate multi-spall. For SME, the functionally graded material (FGM) can formed during the unloading process. By changing the boundary conditions, the fraction distribution of the martensitic phase can be adjusted, suggesting the possibility of producing FGM through a controlled impact loading/unloading process. The general rules of the phase boundary propagation in a finite rod/plate are summarized. [1] Dai X Y et al, Int J Impact Eng, **30**(2004), 385.

¹Work supported by the Chinese Natural Science Foundation (10072058, 10176029)

Weiwei Xu Key Laboratory for Mechanical Behavior and Design of Materials (LMBD) Department of Modern Mechanics University of Science and Technology of China

Electronic form version 1.4

Date submitted: 07 Apr 2005