万见峰[1], 崔书山 戎咏华 张骥华[1]

[1]上海交通大学

Abstract

The phase-field method is a powerful computational approach in modeling microstructure evolution in materials at the mesoscopic scale. The microstructure evolution of thermally induced structural transformation in shape memory alloys (SMAs) has been widely studied by phase-field simulations. In this paper, two-dimensional phase-field simulations of square-to-rectangle structural transformation using finite element method were applied to study the microstructure evolution and associated thermomechanical response of SMAs. The surface relief was observed and was resulted by the rigid rotation, instead of the Bain strain. Triangular martensitic domains was appeared during the pseudoelastic bending process, owing to minimizing of elastic strain energy. The contact stress of SMA pipe coupling is found corresponding to the proceeding of the reverse transformation. The thermomechanical response, obtained by phase-field simulations, was realized by the microstructure evolution. This thermomechanical model belongs to the microscopic thermodynamic models.