Abstract

This study deals with the propagation of longitudinal and shear ultrasonic waves which are transmitted in isotropic thermo elastic materials supposed initially in a stress free state. Ultrasonic waves propagating in a material depend on some elastic properties of the propagation medium such as volume mass and induced deformation resulting from applied mechanical or thermal stresses. They also depend on the nature of propagated longitudinal or shear waves and in this last case they also depend on the polarization direction of the wave. For homogeneous and isotropic materials, no linear mechanics provides acoustoelastic expressions of velocities as function of second and third elastic constants and applied stresses. Submitting a sample to a small temperature change, we study the behaviour of ultrasonic waves in presence of thermomechanical stresses applied according to considered directions of propagation, polarization and loading. A numerical simulation of elastic thermo mechanical effect has been applied to two usual materials in C 33 steel and in AlMg3 aluminium alloy. This method allows simulating the behaviour of ultrasonic wave velocities under elastic thermo mechanical effects