Etude expérimentale et modélisation des cinétiques de transformation de phase dans un alliage de titane

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Abstract: The aim of this thesis is to experimentally study and to model the kinetics of ? + ? ? ? ? ?II phase transformations in Ti-6Al-4V alloy for isothermal and non-isothermal conditions. To this purpose, several technics have been performed (DSC, SEM, optical microscopy, in-situ electrical resistivity and XRD). The KM-JMA equation has been used to describe the kinetics of phase transformations during isothermal holdings. An approach based on the additivity rule has been developed to adapt the KM-JMA equation to non-isothermal phase transformations and is compared to the one using the fictitious time. Kinetics parameters (n, k and Q) have been determined using this approach and discussed based on the microstructural analysis. Mechanisms of the ? + ? ? ? ? ? phase transformations have been discussed by considering the microstructural analysis and the kinetics parameters already determined. Finally, the ?m ? ?II phase transformation kinetics in isothermal conditions has been simulated with the MatCalc software and modelled using both the nucleation – growth theory and the KM-JMA equation.

Keywords : Ti-6Al-4V, KM-JMA, additivity, nucleation – growth