Powder Densification Modeling of the Spark-Plasma-Sintering Process

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Abstract

The Spark Plasma Sintering is a breakthrough way of elaboration of more or less complex shape materials from powder. This process allows the sintering of materials in few minutes compare to hours by conventional sintering. One of the main goals of the SPS modeling is to be able to predict the densification of the powder during the process. In COMSOL Multiphysics® it is possible to implement sintering laws using the Nonlinear Structural Materials module and to define a tensor without writing a specific script. In the present work, two different creep porous laws described respectively by Olevsky [1] and Abouaf [2] have been used. These laws, first implemented in an analytic model of the SPS process, give us good accordance between simulated and experimental densification curves. The analytic and finite element models are compared and show also a good correlation. Finally the case of a complex shape material densification is presented.

Reference

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