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MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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A NEW TECHNOLOGY FOR PRODUCTION OF HIGH THICKNESS CARBON/ CARBON COMPOSITES FOR LAUNCHERS APPLICATION.

Abstract

Composites are widely used in space vehicles and systems as structural materials, thermal protection systems etc. Among all, carbon-based ceramic composites are the most promising materials for high temperature applications, due to their impressive thermal stability and lightweight. In particular C/C composites have already shown their extraordinary features in terms of high stability and excellent mechanical properties, almost unchanged at high temperatures. Moreover, Carbon-Carbon (C/C) composites offer a wide range of properties that can be tailored by selection of constituent materials, fiber orientations, and the details of fabrication. In fact fiber textile and matrix are designed simultaneously so that the composite properties can be selected to enhance the performance of the component. One of the C/C application are engine applications such as nozzle throat section for launchers. The main feature for this application is the high resistance at high temperatures. In these applications high thickness of the composite is required. Nevertheless the long studies performed all over the world on this material, there is no a standard method for production and one of the most critical issue is to obtain an uniform material at high thicknesses. The manufacturing method is still an industrial secret not shared with the scientific community with a standard production method such as the case of metal products. Therefore there is the need to study the manufacturing method process. In this paper the material structure is studied by the use of numerical analysis. The manufacturing method has been studied and the results are here presented showing the main criticalities of each phase of the process from the preform preparation to the infiltration. Characterization tests such as morphological analysis by the use of SEM , mechanical analysis and water absorption have been performed in order to study the final properties of the manufactured material.