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Thermal degradation analysis of innovative PEKK-based carbon composites for high-temperature aeronautical components

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Abstract

Nowadays, composite materials find a large application in several engineering fields, spanning from automotive to aerospace sectors. In the latter, especially in aircraft civil transportation, severe fireproof requirements must be accomplished, taking into account that the second most frequent cause of fatal accidents involving airplanes, was the post-impact fire/smoke, as reported by the European Aviation Safety Agency (EASA) in 2014. In the light of this, experimental research is of crucial importance in the understanding thermal behavior of composites for aircraft components, when exposed to high-temperature and fire conditions. In this context, a thermal degradation study is carried out for two carbon-reinforced resins: the well known thermosetting phenolic and a thermoplastic polyether-ketone-ketone (PEKK), recently developed specifically for this kind of application. The aim is to evaluate the PEKK behavior and to understand the impact of composite nature in terms of structural strength under fire. To this end, thermogravimetric analysis were performed for three different non-isothermal heating programs, between 30 and 1000 °C. Under inert atmosphere one single global reaction is observed for carbon-PEKK between 500-700

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