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Novel phenolic impregnated 3-D Fine-woven pierced carbon fabric composites: Microstructure and ablation behavior

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Abstract

The processing, microstructure and ablative properties of novel phenolic impregnated 3-D Fine-woven pierced carbon fabric ablator (PICA) with different bulk density were investigated. The density of PICA material ranges from 0.352 to 0.701 g/cm³ that having uniform resin distribution within the fibrous substrate. An oxyacetylene torch was used to explore the ablative characteristics in terms of linear/mass ablation rate and microscopic pattern of ablation. Surface and in-depth temperatures during ablation were measured by using optical pyrometers and thermocouples. The experimental results showed that the linear ablation rate varied between 0.019 and 0.036 mm/s and the mass ablation rate increased from 0.045 to 0.061 g/s for the tested PICA composites. It suggests that the PICA composites with lower density may significantly contribute to improving the thermal insulation and ablative properties.



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Keywords

A. Carbon fiber; B. Thermal Properties; B. Environmental degradation; D. Electron Microscopy

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