

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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THE ABLATIVE PERFORMANCE OF LIGHT WEIGHT CHARRING ABLATORS IN HIGH
ENTHALPY ENVIRONMENT

Abstract

Heat protection is an important technology in hypersonic flight reentry, and the light weight charring ablators is one kind of materials which is used in heat protection usually. In future, the characteristic of reentry thermal environment is high enthalpy, high heat flux and low pressure, so that the ablative performance in high enthalpy of heat resistant material is crucial. Super-Enthalpy arc-heater is an important facility to make high enthalpy and low pressure flow field in ground simulation test. In order to meet the requirements, the performance of different light weight charring ablators in high enthalpy ablation test must be known. These kinds of tests have been carried out by using Super-Enthalpy arc-heater which is made by CAAA. In this paper, theory and development of Super-Enthalpy arc-heater are introduced including the work ability and condition parameters of the one produced by CAAA. The supersonic free jet stagnation test is shown to evaluate the ablative performance of heat resistant material. Subsequently through the description of test data, the characteristics of light weight charring ablators ablated in high enthalpy and low pressure are given. At last contrasting to the normal test with middle enthalpy, the ablative performances affected by enthalpy of light weight charring ablators are detailedly analyzed. The results show that Super-Enthalpy arc-heater can produce a high enthalpy and low pressure flow field stably and uniformly. Also the performances of light weight charring ablators are a little improved in high enthalpy environment.