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Author: Mr. Jian-qiang Tu

China Academy of Aerospace Aerodynamics (CAAA), China, tujianqiang0806@163.com

Mr. Lian-zhong Chen

China Academy of Aerospace Aerodynamics (CAAA), China, agent9@sina.com

Mr. Jin-long peng

China Academy of Aerospace Aerodynamics (CAAA), China, agent9@sina.com

TESTING OF COMBUSTOR CHAMBER MATERIAL IN ARC JET FLOW MIXING WITH
TRANSVERSE INJECTED WATER**Abstract**

In the combustor inner flow thermal environment, the oxidation reaction of combustor inner surface thermal protection material, such as C/SiC and Ultra High Temperature Ceramic (UHTC), is more rapid in water vapor as a product of combustion than in oxygen. The water vapor also reacts with silica glass, formed in the combustor inner surface to prevent oxidation, to destroy the protective layer by volatilization. It has a serious impact on the combustor thermal protection performance. In the paper, the combustor inner flow thermal environment has been simulated by plasma arc heating supersonic rectangular Turbulent Flow Duct (TFD). At same time, the ambient-temperature water, whose mass flow rate is 4%-5% of the flow, has been transversely injected into the mixing chamber, located at the end of the arc heater and before the nozzle, in order to mix with the high-temperature air and simulate the component, mass flow rate and temperature of water vapor coming from hydrocarbon combustion. The effect of the length of mixing chamber on the mixing uniformity between the water and the high-temperature air has been analysis by numerical calculation. The total enthalpy calculation method of the mixing gas has also been discussed.