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ARC-HEATED EXPERIMENTAL METHOD INVESTIGATION ON THE SCRAMJET COMBUSTOR
WALL THERMAL PROTECTION MATERIAL**Abstract**

The plasma arc heating supersonic rectangle turbulent flow duct (TFD) has been used to simulate the inner flow and outer flow thermal environments, which are usually taken place in the inner surface of Scramjet combustor and the outer surface of hypersonic vehicle, respectively. These two kinds of thermal environments have been compared by measuring the cold-wall heat flux of plate and testing the thermal protection material. Due to the effect of thermal radiation heat transfer, the cold-wall heat flux of inner flow is higher 20%-40% than that of outer flow under the same flow condition. But in two kinds of typical combustor flow conditions, the increments of the cold-wall heat fluxes are nearly equal. So when the cold-wall heat flux increases, the effect of radiation heat transfer will gradually decrease. In material test experiment, the surface temperature of the C/SiC composites in the inner flow is higher about 400 than that in the outer flow. And it may be the key whether the thermal protection material can be ablated or not.