

TITLE: *Thermal performance of a mechanically attached ablator tile for on-orbit repair of shuttle TPS*

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Abstract:

The reusable surface insulation (RSI) material used in the **shuttle** thermal protection system is susceptible to **damage**. If any RSI tiles are damaged or lost during ascent, they must be repaired or replaced prior to entry. One approach to replacing a damaged or missing RSI **tile** consists of mechanically attaching a **tile** of ablation material in the place of the RSI **tile**. The thermal performance of this type of repair **tile** was evaluated in a simulated entry heating environment. The test specimen consisted of the ablator repair **tile** mechanically fastened to the strain isolation pad and surrounded by RSI tiles. The evaluation of the thermal performance was based on temperature response, surface integrity, and predicted flight performance. When the ablator **tile** protruded 1/8 inch above the surrounding RSI tiles, the forward facing steps caused significant inflow of hot gas down the ablator RSI joints and this inflow caused greatly increased back surface temperatures.

Major Subject Terms:

ABLATIVE MATERIALS ● PERFORMANCE TESTS ● REENTRY ● SPACE **SHUTTLE ORBITERS** ● THERMAL INSULATION ● THERMAL PROTECTION

Minor Subject Terms:

ASCENT ● FASTENERS ● ORBITAL ASSEMBLY ● TILES

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