NASA SBIR 2008 Phase I Solicitation

X8.01 Detachable, Human-Rated, Ablative Environmentally Compliant TPS

Lead Center: ARC

Participating Center(s): GRC, JPL, JSC, LaRC

The technologies described below support the goal of developing higher performance TPS materials and integrated entry systems architectures for higher performance CEV as well as future Exploration missions.

Development of TPS materials for maximum reliability and survivability with minimized mass requirements, under severe combined convective and radiative heating, including development of acreage materials, adhesives, joints, penetrations, deployables, inflatables and seals.

Heat flux sensors and surface recession diagnostics tools are needed for flight systems to provide better traceability from the modeling and design tools to actual performance. This leads to higher fidelity design tools, risk reduction, decreased heat shield mass and a direct payload increase.

Non Destructive Evaluation (NDE) tools are sought to verify design requirements are met during manufacturing and assembly of the heat shield, e.g., verifying that anisotropic materials have been installed in their proper orientation, that the bondline as well as the TPS materials themselves have the proper integrity and are free of voids or defects.

Advances are sought in ablation modeling, including radiation, convection, gas surface interactions, pyrolysis, coking, and charring. There is a specific need for improved models for low density charring ablators.

Advances in Multidisciplinary Design Optimization (MDO) are sought specifically in application to address combined aerothermal environments, material response, vehicle shape, vehicle size, aerodynamic stability, mass, and cross-range, characterizing the entry vehicle design problem.

Technology Readiness Levels (TRL) of 4 or higher are sought.

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