Preface

Applied research needs identified directions in order to attract realistic funding from projects foreseen. In hypersonics, applications must include small, simple vehicles for costs to be acceptable. Of these, this Theme considers two:

1. a space station ambulance that offers the injured a flexible re-entry 'window', a high crossrange, and, above all, very low g-forces throughout their flight to Earth, and

2. a small aerospaceplane giving hypersonic cruise or access to orbit.

For re-entry research and the Space Station ambulance, the need is seen to be for the study of configurations, aerodynamics and aerothermodynamics for a slender vehicle and of materials and structures to withstand more prolonged re-entry heating than current vehicles and total flight times of perhaps 50 minutes. The vehicle will require a high lift-to-drag ratio, but it will be small, structurally simple and will need minimal propulsion.

For the small aerospaceplane, this issue singles out particular aspects of propulsion, which next generation designers should acknowledge; hydrocarbon fuels offer much that hydrogen may prevent, cooled compression in the intake offers higher thrust from scramjets of given size, and the basic choice of one engine type from the many considered remains an essential need. In the longer term, commercially reusable space launchers may depend on the efficient use of air-breathing propulsion and of hydrogen fuel. That in turn may depend on the efficient gathering and on-board storage of oxygen from the air breathed during atmospheric flight, for subsequent use in the final rocket-powered acceleration to orbit.

The issue examines research requirements for a space station ambulance (SLEEC) and the small aerospaceplane or SSTO demonstrator.

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