

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Hypersonic Air-breathing and Combined Cycle Propulsion, and Hypersonic Vehicle (7)

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SPACE AIR BREATHING ROCKET ENGINE

**Abstract**

The increase in traffic to the space and ongoing hype of space tourism and colonization has brought in the requirement for more feasible, affordable and efficient way to go to space. The major problem with present age rocket engine is the weight of fuel which it needs to carry to get into the orbit which henceforth reduces the payload capacity of the rocket. This problem can be solved for introducing a hybrid rocket engine which can work in both air breathing and non-air breathing mode. This kind of engine is known as SABRE (Space Air Breathing Rocket Engine) or Single stage to orbit engine. It has the capability to propel using oxygen from surrounding while inside atmosphere working as air breathing engine and a conventional rocket engine outside the atmosphere. This in case reduces the operation cost as well as easiness. Such kind of engine could become the future of aviation and space industry, which may ease many missions from earth's surface to space. This research paper deals with design and development of SABRE with detailed study of its performance and efficiency and its comparative study with pre-existing technologies.