

SPACE PROPULSION SYMPOSIUM (C4)  
Propulsion Technology (3)

Author: Prof. Alexander Alexandrovich Kozlov  
Moscow Aviation Institute, Russian Federation, kozlov202@mai.ru

Mr. Alexey Gennadievich Vorobiev  
Moscow Aviation Institute, Russian Federation, formula1\_av@mail.ru

Dr. Igor Nikolaevich Borovik  
Moscow Aviation Institute (National Research University, MAI), Russian Federation, borra2000@mail.ru

DEVELOPMENT OF THRUSTS WITH CERAMIC-COMPOSITE COMBUSTION CHAMBER

**Abstract**

The department No. 202 of Moscow Aviation Institute (MAI) is researching the application of ceramic-composite combustion chamber and nozzle to existing 200 and 500 N thrusts. Using ceramic-composite materials allow reducing the mass of thrusts and increasing permissible wall temperature, which makes it possible to increasing working temperature near walls, hence specific impulse can be increased. Anti-oxidizer coatings to inner wall allow changing film-cooling component from fuel to oxidizer.

In order to apply ceramic-composite materials, following technological problems must be investigated.

- forming of thin shell profile
- material resistance from oxidizer environment by coating
- reliable connection method between ceramic-composite combustion chamber and steel mixing head
- gas impermeability of the material
- maintenance of material strength under pressure and temperature conditions

The benefits of using such materials are demonstrated by the mathematical model of heat state of LRE calculation and preliminary fire tests of 200 N and 500 N thrusts.