Experimentation of Warm Gas Generator Emerging Technologies

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Introduction

Warm gas generators are used on various space and defense technologies. The difficulty lies in controlling the flame temperature of propellants and hot gases.

- Typically, the flame temperature of the propellants are 4,500 – 5,550°F.[1]
- Warm gas generator systems are limited to 2,200-2,300°F.[1]

The objective of the study is to conduct experiments of coolant beds to decrease temperatures of hot gases and determine the physics to describe the results.

Methodology

At UAH, new methods for controlling the temperature are being researched using state-of-the-art laboratories for hot fire combustion chamber testing and x-ray computed tomography. This process will be aided with statistical analysis through Design of Experiments.

Results

The combustion chamber is equipped with thermocouples to record the temperature gradient from the propellant to coolant bed. An x-ray device is used to observe real time ablation process.

Impact

Emerging technologies in the space industry are trying to fill a technology gap to improve warm gas generator systems. Coolant beds are being analyzed as a possible means to reduce the temperature and make them more effective.

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