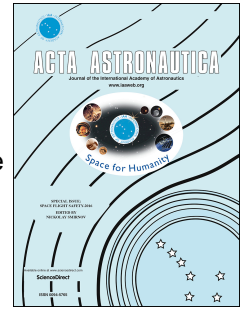


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Effect of the heat release distribution on the stability of component coordination in the rocket-based combined cycle engine by numerical and freejet experimental analysis

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1 **Effect of the heat release distribution on the stability of component coordination**  
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4  
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8  
9 Abstract

10 Efficient combustion without damaging the inlet state is the key to achieve the stable  
11 operation in the engine. In the present study, effect of the heat release distribution on  
12 the component matching is analysed on an integrated rocket-based combined cycle  
13 (RBCC) model through three-dimensional numerical simulations and the freejet tests  
14 under  $Ma_\infty = 4$  and  $Ma_\infty = 5$  conditions. Numerical pressures are in good agreement  
15 with the experimental data. Results indicate that the increasing pre-combustion shock  
16 strength during the movement can balance the pressure difference between air intake  
17 and combustion effectively. In order to ensure inlet operation, the main combustion  
18 heat should be released in the back cavity under  $Ma_\infty = 3$  condition. Thus, the thermal  
19 choking can be controlled in the combustor exit to employ high-pressure combustion  
20 to generate thrust in the large expansion section. With the flight velocity increasing,  
21 the main combustion zone should be moved forward and control thermal choking in

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