

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)  
Small Launchers: Concepts and Operations (7)

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## PERFORMANCE BOUNDARIES OF A SMALL BI-LIQUID EXPERIMENTAL ROCKET ENGINE

**Abstract**

This development is embedded within the SMART Rockets Project at Technische Universität Dresden in which we aim to fly our sounding rocket “Mira” featuring a 500 N bi-liquid engine using ethanol and liquid oxygen. The project is part of the STERN education programme by the German space administration. Hence, the rocket, the ground support equipment and the rocket engine itself are designed, assembled, tested and qualified mainly by students of our university. Following previous works that focused on trajectory simulations and the flight stability of the rocket, this paper focuses on experimental investigations of the performance boundaries of the developed flight engine. In particular the maximum thrust with respect to increased feeding pressures and decreased burn times are examined. The higher thrust to weight ratio would decrease the rocket’s sensitivity regarding wind and the gravity turn phenomenon, leading to a broader range of acceptable launch conditions. Thus, the setup and results of the rocket engine tests are thoroughly described and their relation to previous tests discussed in detail.