

## SPACE PROPULSION SYMPOSIUM (C4)

## Poster Session (P)

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## WIND TUNNEL RESEARCH ON FORWARD-FACING CAVITY FLOW

**Abstract**

A forward-facing cavity will be composed of the components of a scramjet from inlet to combustion chamber which has a uncovered inlet before the separation of the booster. Longitudinal oscillations are generated within the cavity under some certain flow conditions. Strong oscillations may damage the components of the scramjet, or induce bow-shock oscillations which may cause unsteady loads on the missile and affect the performance of the aerodynamical characteristics. An experimental study of missile model with a scramjet was conducted in a trisonic windtunnel. The characteristics of cavity flow were researched by both the dynamic force measurement and the fluctuation pressure measurement. In the experiments the oscillations within the cavity and the bow-shock in front of the inlet interacted. The oscillations of cavity flow and bow-shock affected the fluctuation pressure and the aerodynamical characteristics of missile remarkably. The amplitude of axial force was higher than the normal force's. The RMS of the fluctuation pressure of some measured place inside the scramjet reached a quarter of the total pressure, and the amplitude of the fluctuation reached half of the total pressure. Those might threaten the safety of the structure of the scramjet.