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# A CONCEPT STUDY OF A LAUNCH VEHICLE PROPELLED BY SOLID-FUEL SCRAMJET

**Abstract**

The applying of scramjet on space transportation have been intensively studied in the past decades. However, the researchers mainly focus on the liquid fueled scramjet. The solid-fuel scramjet has not been widely discussed. In the present work, a launch vehicle with a dual-mode solid-fuel scramjet stage is proposed. The rocket has four stages in total. It can be launched from an aircraft or on the ground. The first stage is a solid booster that propels the rocket into supersonic flight. The second stage is equipped with a dual-mode solid-fuel scramjet which works both with supersonic and hypersonic flows. The third and fourth stages are both propelled by solid motors. The potential of applying this rocket for space experiment and launching small payloads is investigated. Its trajectory is studied with optimization techniques. The rocket designed with a lifting body configuration integrating two inlets. A low cost Guidance-Navigation and Control system is proposed as well.