

22nd IAA SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FUTURE (D4)
Innovative Concepts and Technologies (1)

Author: Prof. Yi Li
Northwestern Polytechnical University, China

Mr. Menglin Zheng
Northwestern Polytechnical University, China

Prof. Gongling Sun
International Space University, France

Mr. Longshuai Li
Northwestern Polytechnical University, China

Mr. Shixiang Li
Northwestern Polytechnical University, China

Mr. Weiqiang Li
Northwestern Polytechnical University, China

Ms. Yiling Xia
Northwestern Polytechnical University, China

THE CONCEPT STUDY OF AN INFLATABLE ROCKET FOR THE MARS SAMPLE RETURN
MISSION

Abstract

The inflatable mechanism has already been applied on re-entry vehicles as a decelerator, which has the advantage of lightweight. As it is too expensive to send payloads to the Mars, a compact and light Mars ascent vehicle is desired in the sample return mission. In this paper, a rocket with inflatable parts, including nose, body and fins are proposed. The aerodynamic configuration is designed considering the special mission. An aerodynamics study of the flexible body is carried out with Computational Fluid Dynamics techniques, which is utilized to design the ascent trajectory. Moreover, a small-scale rocket is manufactured and tested to evaluate the flight performances of the inflatable rocket.