Special Issue: DTD 2006 in JAPAN
Original Article

J. Jpn. Soc. Microgravity Appl. Vol. 24 No. 3 2007 (307-311)

Free Aerial Fall Capsule for Microgravity Experiment of a 20 Sec Class

Ryojiro AKIBA[1], Ikuo EGAMI[2], Shoki YANO[3],Takemasa KOREKI[4],Masamichi YAMASHITA[5], Daisuke AKITA[6] and Takamasa YAMAGAMI[7]

[1] HASTIC/USEF, Sapporo/Tokyo, Japan, akiba@usef.or.jp
[2] HASTIC/Uchusen Inc., Tokyo, Japan, i.egami@uchusen-net.com
[3]HASTIC, Sapporo, Japan, yanoluke@titan.ocn.ne.jp
[4]HASTIC/IAC, Tomioka, Japan, takemasa-koreki@iac.ihi.co.jp
[5] JAXA, Sagamihara, Japan, yamashita@surc.isas.jaxa.jp
[6] JAXA, Sagamihara, Japan, akita@balloon.isas.jaxa.jp
[7] JAXA, Sagamihara, Japan, yamagami.takamasa@jaxa.jp

Abstract

Conceptual design of a new convenient free fall capsule was developed for conducting animal experiment. In order to provide microgravity environment for at least 20 sec, technical feasibility of an atmospheric balloon borne system was examined. An experiment capsule is hung up by a balloon up to 3,000 m height. Free fall down to 1,000 m creates 20 sec microgravity environment inside the capsule. The terminal velocity of 196m/s, reaching after the fall, should be safely decelerated by deploying a parachute or any other appropriate way. The landing velocity is managed to be suppressed to around 1m/s. In order to cancel fluid dynamical drag during the free fall, use of a thruster system is one of the candidates. Our design goal is to develop the capsule that could be repetitively operated at affordable expenses. Safe recovery of the system after free fall might be the key for such concept. We hope our system would cradle many seeds of application by providing convenient access to microgravity.