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REENTRY FLIGHT AND RECOVERY OPERATION OF HAYABUSA SAMPLE RETURN CAPSULE

Abstract

At the final phase of the Hayabusa mission, a small capsule with asteroid sample will enter the earth atmosphere and is to be recovered in the desert of the Australia in the middle of June, 2010. The present paper overviews the reentry flight of the sample return capsule (SRC) and its recovery operation. Though the extended abstract submitted here describes the reentry and recovery plans, actual reentry will have been successfully accomplished by the actual conference. SRC is separated from the mother spacecraft about 3 hours before the reentry after SRC's setting parameter commands have been transferred. SRC is separated with higher temperature potential heated-up by mother spacecraft so that the temperature decrease of the SRC during its individual flight is made minimum. SRC adopts two triggering methods. The primary is a G-sensing method, in which the chute triggering timer is activated at a given deceleration level (20 G as a default), and the chute is deployed after a given seconds. The secondary timer, prescribing the time after the separation, behaves a backup at the estimated latest time in case that chute deployment is not normally triggered. Both of the forebody and the aftbody heatshields are separated from the instrument module simultaneously at one action of the pyrotechnic chute-separation mechanizm. Eight seconds after the chute deployment, SRC starts transmitting beacon signal. During slow descent phase of the SRC with chute, localization is carried out based on the beacons signal received by DFS' as a cross point of each azimuth direction vector from a DFS. At the (estimated maximum) landing time of SRC, the helicopter hovering in the air outside a given impact probability ellipse starts to target the position indicated by DFS' or by its onboard direction finding system. Regardless the instrument module continues to transmit the beacon or not after landing, the helicopter will search out the instrument module based on one of (or both of) two localization information. The forebody and aftbody heatshield are to be searched out by an infrared camera mounted on the helicopter during the night before the heatshields experience the daylight, which will undesirably equilibrate the heatshields' relatively hot temperatures with the ground temperature, which makes it difficult to discriminate them. The both of the instrument module and the heatshields are subject to safety measures and to be recovered.