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## Report on Solar Power Sail Deployment Mission of IKAROS

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Japan Aerospace Exploration Agency (JAXA) launched the solar power sail orbiter IKAROS, on May 21th, 2010. IKAROS demonstrates a new propulsion technology of utilizing photons from the sun, and an electrical power generation using solar cell film, for deep space exploration, which is called the Solar Power Sail technology.

The IKAROS is a small demonstrator of the solar power sail technology, as a front-loading demonstration for risk reduction of a future solar power sail mission. IKAROS is a spin type orbiter that deploys a large solar power sail utilizing centrifugal force, in an interplanetary orbit.

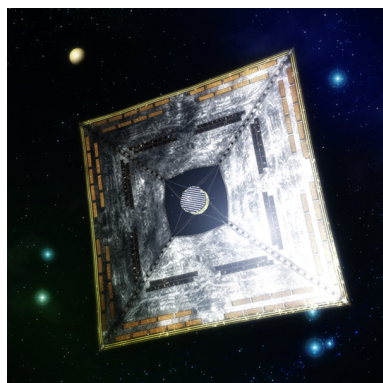
IKAROS will conduct the following missions,

- 1)Expand the solar power sail that diameter is 20 meter class, and obtain the characteristic of a sail dynamics.
- 2)Generate electric power using the very thin flexible solar arrays attached on the sail, and evaluate their performance and depletion.
- 3)Demonstrate the navigation technology utilizing acceleration arisen by photon pressure on the sail.
- 4)Estimate a length and direction of acceleration vector of photon pressure.

We developed the new mechanical system to deploy a larger solar power sail for IKAROS that realizes a two phase deployment method we proposed. The deployment method is composed of two sequences, that is, quasi-static deployment sequence "First stage deployment" and a dynamical deployment sequence "Second stage deployment".

IKAROS succeeds to deploy the solar power sail on June 9th, 2010, the first in the world. We detect and evaluate dynamics of the sail using rate gyros (RG), acceleration sensor attached to tip of the sail, and monitor camera system. IKAROS can demonstrate the new deployment method and the deployment mechanism.

We report that result of verification of the function of deployment mechanism and a 20m class solar power sail dynamics in inter-planetary orbit, in this paper.



Keywords: IKAROS, Solar Power Sail, Exploration