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EDUCATION

- 2019-current Master of Engineering in Aerospace Engineering
Nihon University, Funabashi, Chiba
(academic acceleration)
- 2016-2019 Bachelor of Engineering in Aerospace Engineering
Nihon University, Funabashi, Chiba
(Dropout for academic acceleration)
- 2013-2016 Nagaoka High School, Nagaoka, Niigata

QUALIFICATION

- Amateur 3rd-Class Radio Operator, 2019
- Driver's License, 2017

PROFESSIONAL SOCIETY

- 2019-current The Japan Society for Aeronautical and Space Sciences

PRESENTATION

1. A. Tataru, Y. Miyazaki, ソーラーセイルのスピン展開における力学的相似則, 第62回構造強度に関する講演会, online, (To be appeared, Oral)
2. M. Shibayama, A. Tataru, Y. Miyazaki, 柔軟構造物の展開運動における主要モードの導出, 第35回宇宙構造・材料シンポジウム, B17, pp.1-5, Institute of Space and Astronautical Science, Sagami-hara, Kanagawa (Oral)
3. A. Tataru, M. Shibayama, Y. Miyazaki, Effect on crease stiffness and its variation of for the deployment of membrane structure, The 63rd Space Proceeding the space Science and Technology Conference, JSASS-2019-4105, pp.1-6, Tokushima, Tokushima (Oral)
4. M. Shibayama, A. Tataru, Y. Miyazaki, 膜構造物の展開運動のモード分解, 第61回構造強度に関する講演会, 1A12, pp.1-3, Nagano, Nagano (Oral)

KEY WORDS

Motion Prediction, Membrane Structures, Solar Sail, FEM (Finite Element Method), Mode Decomposition, OKEANOS

STUDY OVERVIEW

“MOTION PREDICTION OF LARGE GOSSAMER STRUCTURE IN SPACE”

BACKGROUND

A lot of advanced space science missions using large gossamer space structures (large and super lightweight structure using membrane, cable etc.) as shown in Fig.1 are proposed In resent year, but few missions have been realized.



Fig.1 large gossamer structure (left: solar power sail, right: starshade)

The causes are to predict deployment motion by not only numerical analysis but also ground experiment with full-scale model is required for large structure which cannot conduct ground experiment with full-scale model, and motion comprehension of large gossamer structure is not systematized. We aim to solve these points with the following method.

1. GROUND EXPERIMENT WITH SMALL MODEL BASED ON SIMILARITY RULES

Dynamic similarity rules of deployment of solar sail demonstrator “IKAROS” are derived and verified by numerical analysis¹(Fig.2 left). From now on, We will conduct vacuum experiment of small model(Fig.2 center).

2. DERIVATION OF PRELIMINARY MODE BY MODE DECOMPOSITION

We can derive preliminary mode of spin-deployment of IKAROS (Fig.2, right). From now on, we will find the best way to define the basic deployment motion.

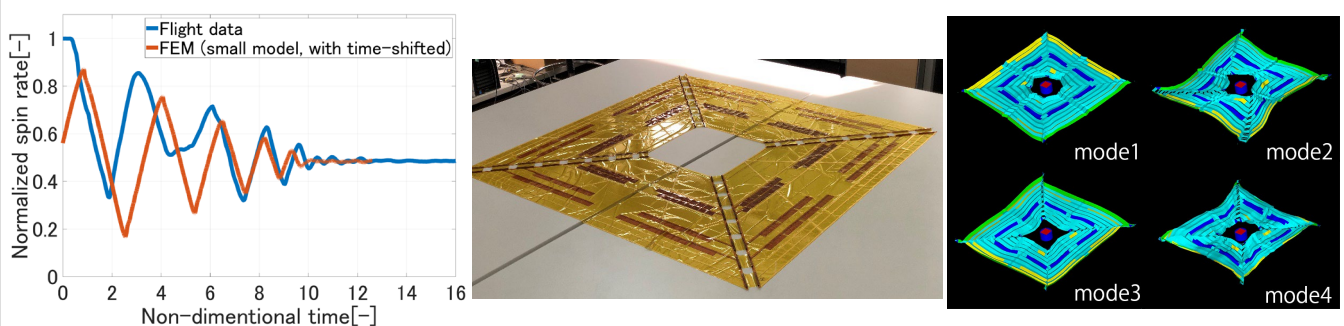


Fig.2 study result (left: comparison of flight data of IKAROS and small model, center: experimental model , right: derived preliminary mode)