

Mayuko Shibayama



Address 7-24-1 Narashinodai, Funabashi, Chiba 274-8501, Japan
Phone +81-47-469-5430
Email shibayama@forth.aero.cst.nihon-u.ac.jp

Education

Master of Engineering, Nihon University, Chiba, Japan, 2018-current
Bachelor of Engineering, Nihon University, Chiba, Japan, March, 2018
Maebashi Girls' Senior High School, Gunma, Japan March, 2014

Qualification

Image Processing Engineers Expert (CG-ARTS), 2018
Engineer-in-Training (Mechanical Engineering), 2017

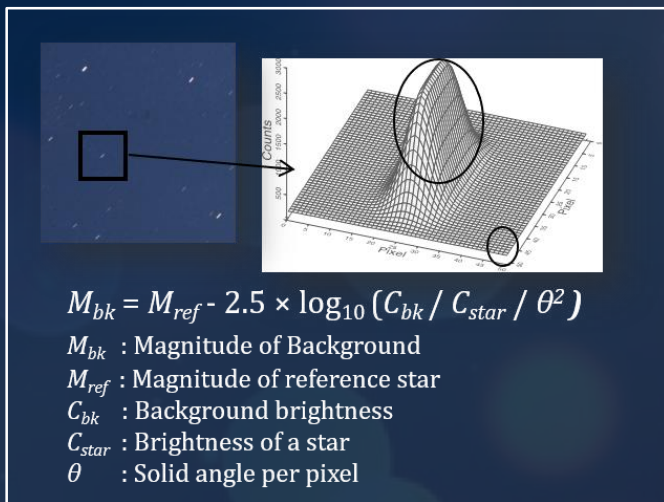
Activity

I am a member of Hoshizora Kodan. <<https://www.kodan.jp>> Hoshizora Kodan are voluntary individuals who want to protect the quality of our night sky. There are over hundred members, consisting of academics, students, staff of museums, and office workers.

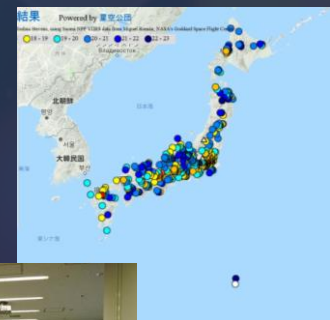


We evaluate night sky brightness in Japan using digital cameras. Anyone can submit the image data taken by digital camera to our Web-site <<https://dcdock.kodan.jp>> for night sky measurement. I analyze the image data and present results .

In addition, I do outreach activities such as workshops, PR through SNS <@KDN_dcdock>, etc. to promote public interest in the nighttime environment and dark skies.



▲ Measurement Principle



▲ Map



▲ Workshop

Presentations

- [1] 柴山万優子, 小野間史樹, 夜空の明るさ自動測定に向けた検討結果, 日本天文学会春季年会, 2019, 春季, pp.573, 2019年3月16日, 法政大学
- [2] 柴山万優子, 小野間史樹, 夜空の明るさの継続的な測定方法および測定結果, 日本天文学会春季年会, 2018, 春季, pp.287, 2018年3月14日, 千葉大学
- [3] 柴山万優子, 小野間史樹, 右田亜朗, 夜空の明るさ測定における眼視測定の有効性検証, 日本天文学会春季年会, 2017, 春季, pp.293, 2017年3月16日, 九州大学
- [4] 小野間史樹, 柴山万優子, 原田泰典, 星空診断「夜空の明るさをはかろうキャンペーン」の展開, 日本天文学会春季年会, 2016, 春季, pp.255, 2016年3月14日, 首都大学東京
- [5] 小野間史樹, 柴山万優子, 大川拓也, 夜空の明るさ測定におけるSky Quality Meterの有効性検証, 日本天文学会春季年会, 2015, 春季, pp.304, 2015年3月19日, 大阪大学

Research

“Mode Decomposition of Deployment of Membrane Structure”

The solar power sail IKAROS (Interplanetary Kite-craft Accelerated by Radiation Of the Sun) was launched in May, 2010 by JAXA, and the 14m-sized sail membrane was successfully deployed in June, 2011. Currently, JAXA is considering the next solar power sail OKEANOS (O utsized Kite-craft for Exploration and AstroNautics in the O uter Solar system, Fig.1). IKAROS and OKEANOS are membrane deployable structures with nonlinear dynamics.

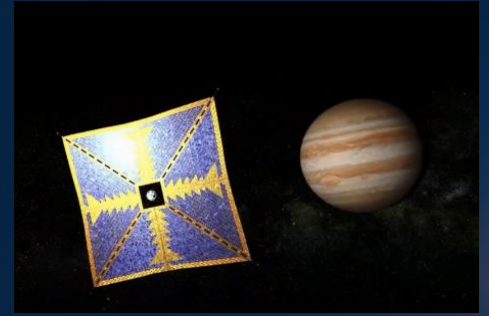


Fig.1 OKEANOS

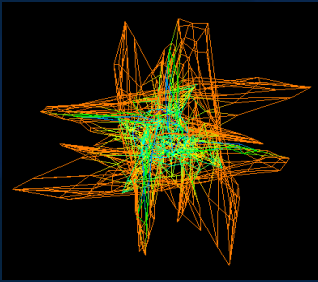


Fig.2 Previous Result

It is important to understand the motion of the structure to design deployable structures. One of the methods to understand the motion is to evaluate basic structural characteristics and the influence of design parameters using mode decomposition.

However, if the state vector is decomposed into linear summation of mode vectors, each mode vector doesn't represent the physical motion because the deployment motion has a large temporal change in state vector, and the geometrical nonlinearity is not negligible. (Fig.2)

Therefore, this study proposes a novel mode decomposition method that decomposes the displacement vector from the ideal nonlinear motion. (Fig.3) The proposed method makes it possible to give the physical meaning to each mode vector, so that the motion characteristics of each mode become clear. It is applied to the numerical analysis of the centrifugal deployment of spinning solar sail. The motion of each mode is visualized as shown in the Fig.4.

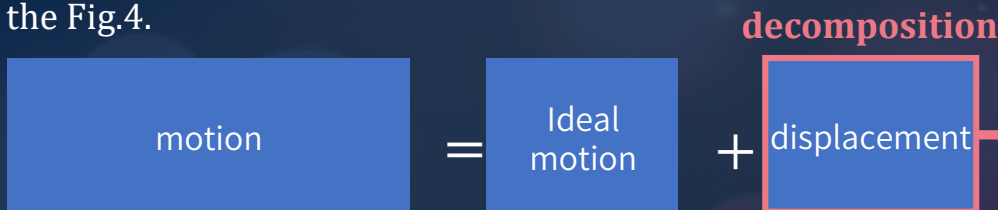


Fig.3 Mode Decomposition Image

In future, I plan to understand the dynamics of membrane deployable structures using the proposed mode decomposition method. Furthermore, mode decomposition is performed by changing the values of design parameters, and the contribution of each mode to the deployment is compared. Finally, I want to evaluate the influence of design parameters on the deployment and apply it to actual design.

Presentations

- [1] 柴山万優子, 宮崎康行, Proposal of a Mode Decomposition Method for Nonlinear Dynamics of Deployable Structures, 第34回宇宙構造・材料シンポジウム, 2018年12月14日, JAXA相模原キャンパス
- [1] 柴山万優子, 多々良飛鳥, 宮崎康行, Mode Decomposition of Deployment of Membrane Structure, 第61回構造強度に関する講演会, 2019年8月7~9日, 長野市生涯学習センター(予定)

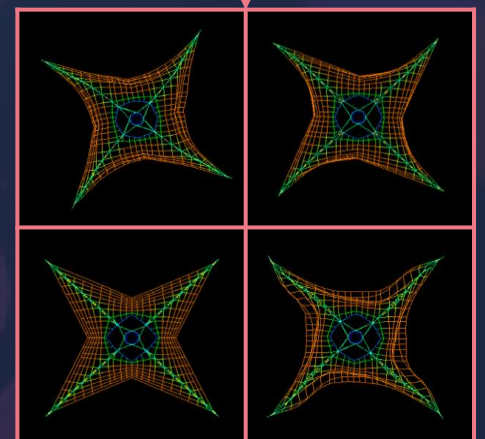


Fig.4 Result