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Education

- Bachelor of Engineering in Aerospace Engineering, Nihon University, Chiba, Japan, 2016 – current
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Qualification

- Amateur Third-Class Radio Operator, 2019



Research Overview

>Theme

“Design of Damper for High-Speed Sliding Portion”

>Research Keyword

Self-Deployable Membrane Truss (SDMT), Damper, Friction, Sliding

>Background

We have been studying on self-deployable structure. It can make it possible to realize large structure in space, for example “Starshade”, “SSPS” and so on. However, there are some problems about deployment system yet. High-speed rotation of hub is one of the problems because it causes stuck of boom that prevent structure deploying. For this reason, angular velocity must be controlled, so I started to design damper, which can be used in space.

Rotation



Fig.1 Principle of deployment

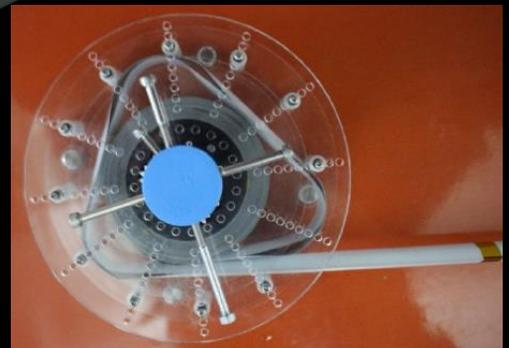


Fig.2 Stuck of boom

>Concept of Damper

Rotary damper is major mechanism to control angular velocity but it's cause of outgas because it uses fluid resistance, so it can't be used in space. Therefore, I must design damper without using fluid. Using friction is one way to obtain resistance torque without using fluid, so I decided to use it. There is another requirement for the design of damper. When boom start to extend, its extension force is weak, so damper mustn't work in initial state not to prevent boom extending. For this reason, my damper is designed to generate resistance torque in accordance with angular velocity. As a result, my design of damper is as shown in following figure.

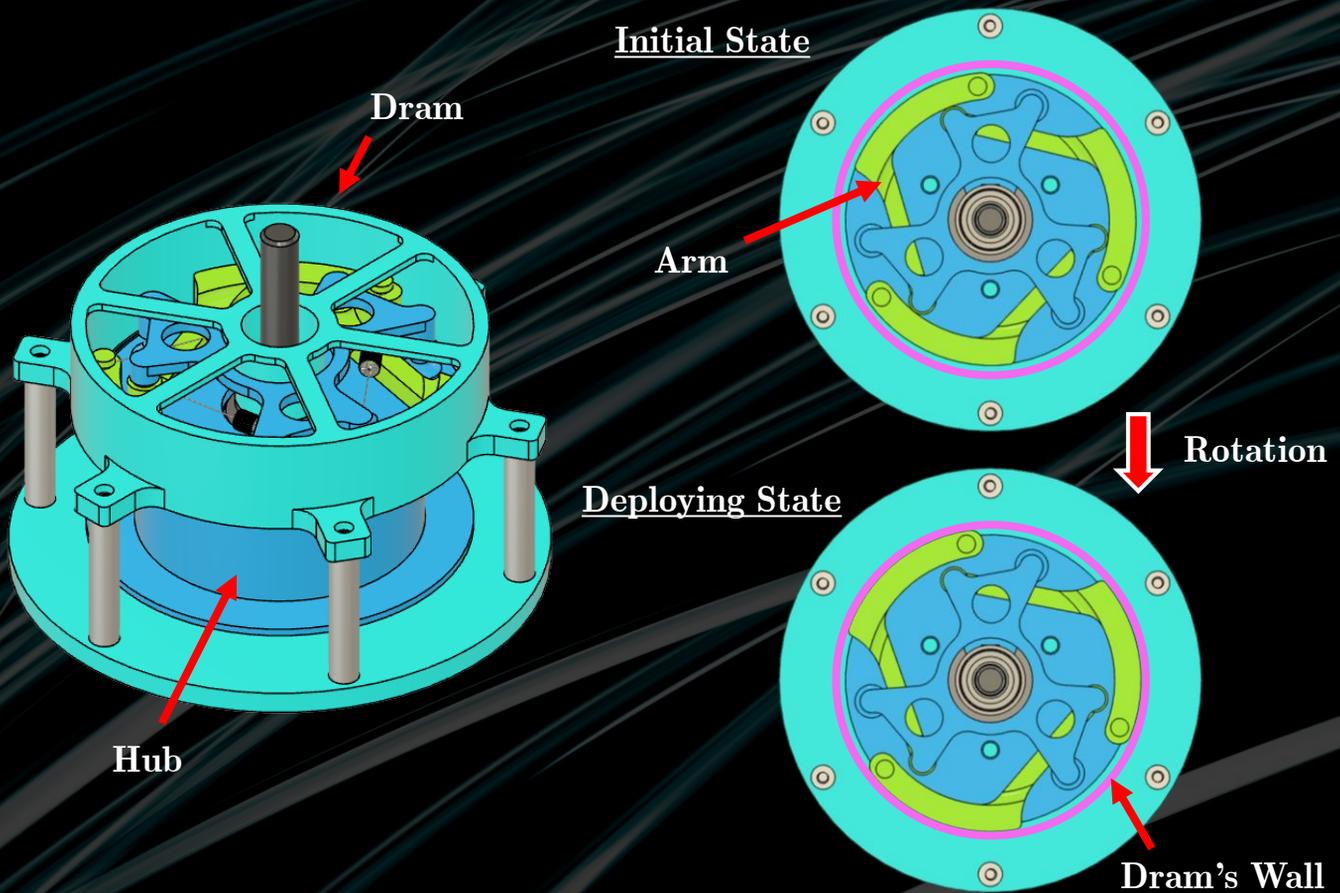


Fig.3 Image of Damper

Three arms (yellow green component) are rotated by centrifugal force generated by rotation of hub and touch dram's wall (pink circle), then friction between arms and dram's wall generate resistance torque.

>Future Plan

- Show effectiveness of my damper by experiment.
- Make appropriate analytical model to calculate exact friction and angular velocity.