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Qualification

Amateur Third-Class Radio Operator

Academic Background

Bachelor of Engineering, Nihon University, Tokyo (to March, 2019)

Research Theme

Bachelor : "Deployment behavior analysis of 3D Self-deployable truss" (This is provisional on June, 2018.)

Keyword

Large Space Structure, Space Structure, Self-deployable Structure, Gossamer Multi-body Dynamics, Nonlinear Finite Element Method, Deployment Behavior Analysis, 3D Self-deployable truss

Research Overview

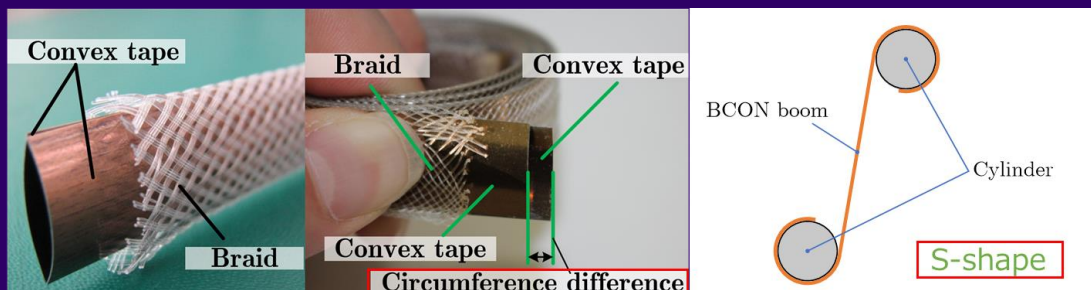
Recently, large space structures such as several tens meter and kilometers size has been considered and proposed by researchers in the world.



Example of Large Space Structure : Stars-hade, SPS-ALPHA, SMAP, OKEANOS

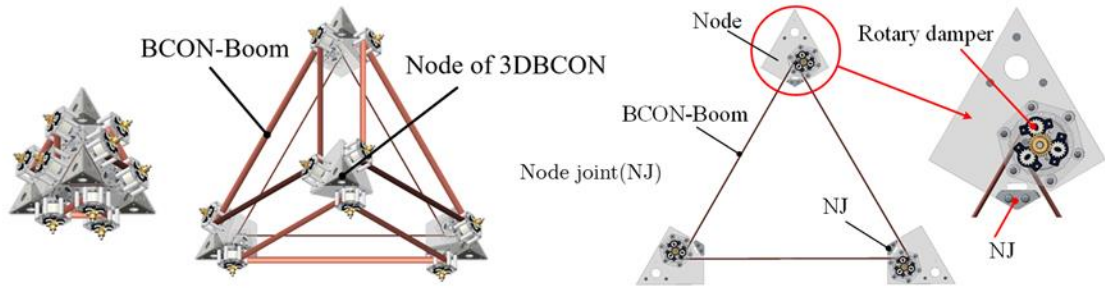
I think that these structure need four characteristics : Deployable structure (High storage efficiency), Adjustment for complicated shapes like a curved surface, Keeping deployed shape (High rigidity structure), Expansibility by modular system (Assembly of module structures).

As a member for fulfilling these functions, our laboratory develops a boom called BCON and applies it to the self-deployable structure. These is shown in the figure below.

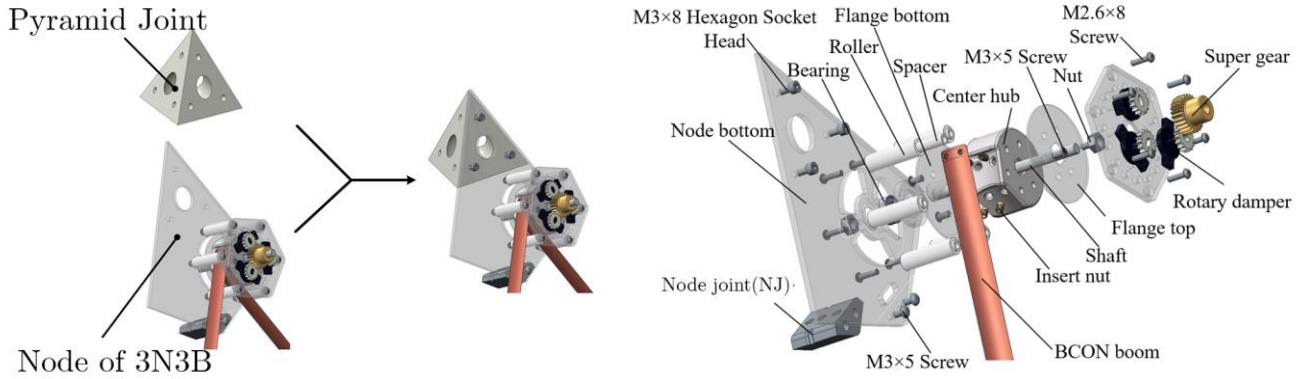


BCON boom (Boom of Bi-convex tapes with Braid mesh)

Furthermore, I think, in addition to the above-mentioned members, if a highly rigid structure having a complicated shape can be realized easily by satisfying the above requirements by applying a 3D self-deployable truss structure to large space structures. The 3D self-deployable truss structure being devised is as shown in the following figure.

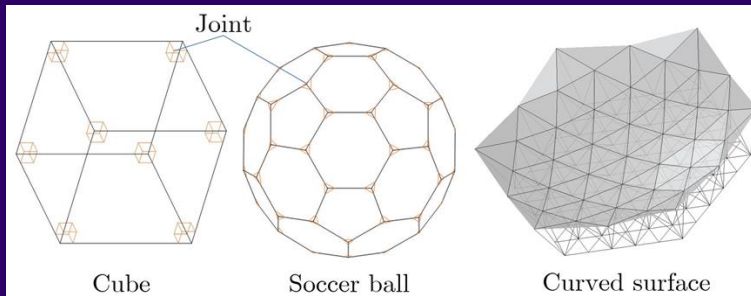


3D self-deployable truss structure's outline drawing



3D self-deployable truss structure's outline drawing

Although this model is merely an example, this has a shape of a regular tetrahedron and also has a module structure. By changing the shape of the joint part, it is also possible to create a module structure of various shapes.



The examples of application can be constructed by 3D self-deployable truss structure

So far, we have cited an example of the application of the self-deployment structure to the space structure considered by our laboratory. Actually, if you are planning to launch a space structure up to space, preliminary verification on the ground is indispensable. However, in the case of large space structures, this ground experiment is considered to be very difficult. Therefore, as a general method to perform as preliminary verification, motion and behavior analysis by numerical calculation can be cited.

In this research: "Deployment Behavior Analysis of 3D Self-Deployable Truss Structure", we aimed to analyze deployment behaviors of only a simple numerical model but also realistic models with higher degree of reproducibility, In addition to evaluating the validity of the truss structure, I would like to continue to lead to the establishing of a more functional 3D self-deployable truss structure by referring to the results.