Numerical Analysis of Boom-Membrane Integrated Deployable Space Structures

14R55023 MinKi KIM
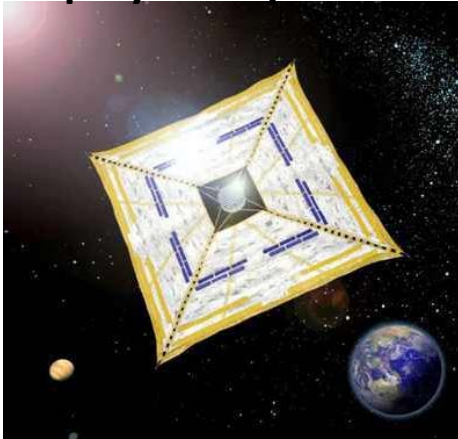
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Background & Objectives
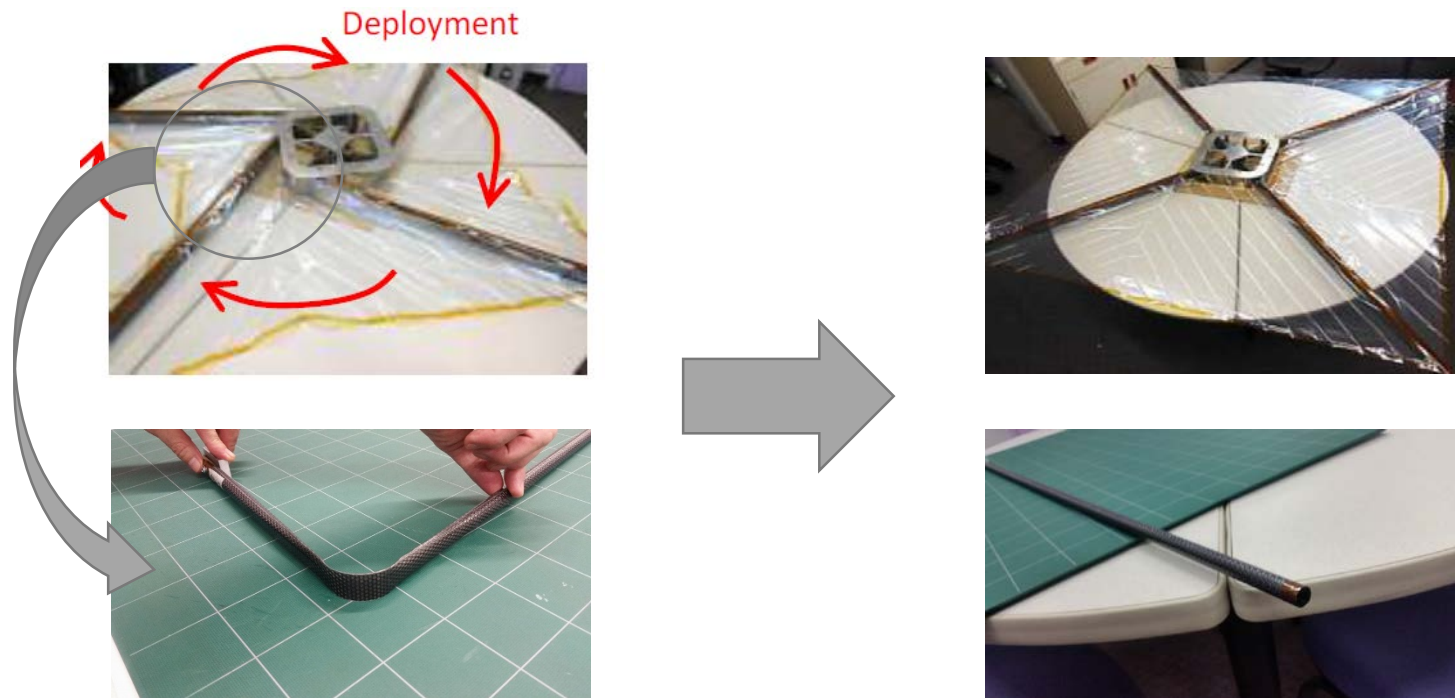
Deployable Space Structures:

- Solar sails: use the pressure of solar photons for deep missions without any propellants.
- De-orbiting systems: deployment membrane systems.
- Large area is needed.
- Need to minimize for launching and unfold in space
- Centrifugal deployment and Deployable boom types

**Mechanics of deployable boom**
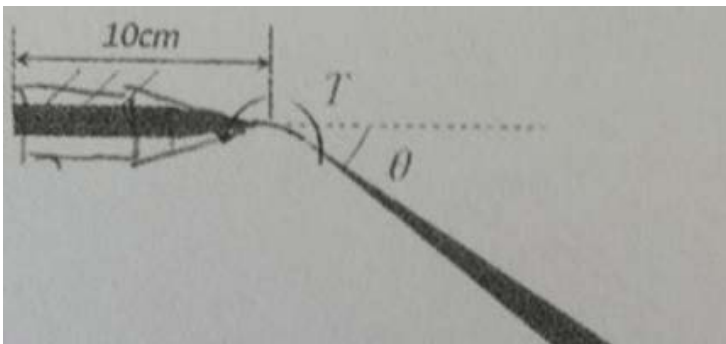
- Deployment torque properties are significant for designing deployable structures,
  - Large geometrical deformation
  - Changing in cross sectional configuration
  - Very complex properties in the course of deployments

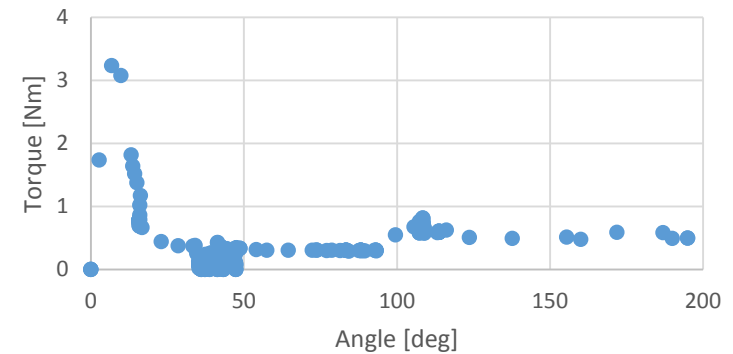# Boom-Membrane Integrated Deployable Structures Model for De-orbiting Systems

CFRP deployable booms (D=13mm, L=1,000mm) with PET membrane (t＝25μ)

Results
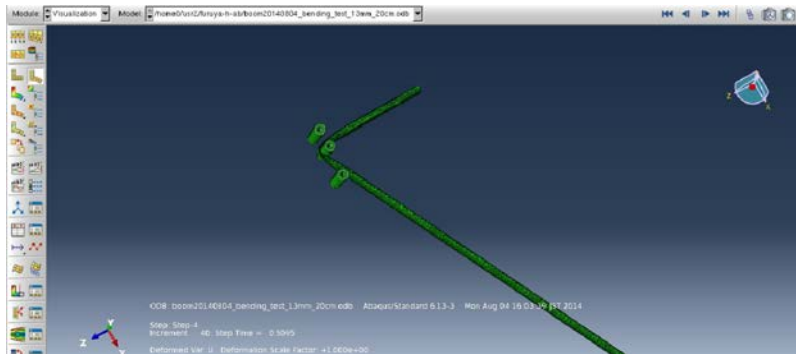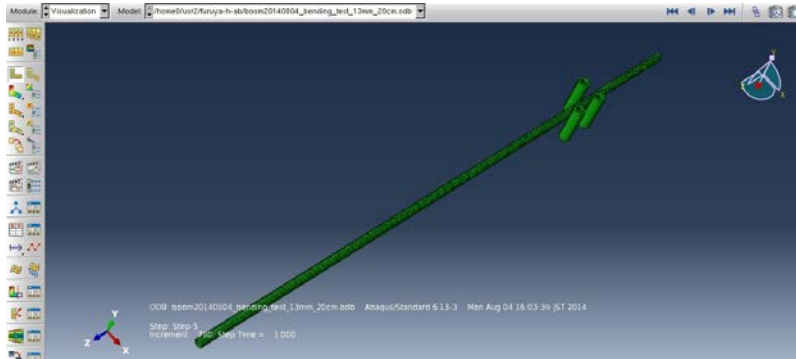
Torque history for folding angle

'TSUBAME' super computer + 'ABAQUS' software

Future works: Deployment process of boom-membrane integrated structures

Japan

Many friends!

Japan

Great Experience!

Thank You