

MINI SPACE ELEVATOR DEMONSTRATION BY CUBESAT "STARS"

Masahiro Nohmi, Shizuoka University



STARS

STARS PROJECT

Chanctreistics Space tether, Rbotic satellite, Sta Mother & daughter (and climber)

Mother satellite

Current

Lorenz force

Space robot

STARS-Debris Removal

<Tether technology>

Orbital transfer by EDT

Earth magnetic field

<Robotic technology> Capture for space debris

pace debris



Released from the ISS on Oct. 6, 2018 Under operation ✓ Mini-Space elevator demonstration



Launched on Oct. 29, 2018 Under operation camera



Released from the ISS in 2016 Decayed ✓ 100m long tether ✓ Kevlar tether



Launched in 2014 Decaved 300m long tether \checkmark ✓ Electro-Dynamic tether



Launched in 2009 Still alive ✓ Mother & daughter ✓ Tethered satellite ✓ Robotic satellite

Active debris removal



Space elevator (Obayashi corporation) Other applications

- Science observation on extremely low earth orbit
- Artificial small gravity
- Electrical power generation by EDT

✓ High resolution ✓ High speed trans. Daughter satellite



STARS-Elevator

SPACE MECHANICAL DYNAMIC CONTROL SYSTEM



Focusing on Tether Extension

◆100m tether deployment by Cubesats

The first satellite in Shizuoka University



Launched and deployed from ISS in 2016



EM Structural Image



Tether set on the Mother

Daughter is fixed



Tether deployment

Electrical boards



Electrical Power System



Electrical Control System



Sensor Board



Communication System



Camera Controller & Module

Electrical boards mounting





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Designed model

Breadboard model



Launched by H-IIB: December 9, 2016 Released from the ISS: December 19, 2016



STARSプロジェクト

Optical Observation from the ground Rendezvous of STARS-C & ISS



倉敷科学センター



鳥取市さじアストロパーク



明石市立天文科学館

STARSプロジェクト

House Keeping Data from CW Beacon



Operation





[Mon Sep 11 07:31:25.735 2017] CPNMS03111+ [Mon Sep 11 07:32:02.825 2017] CPNMS03111+ [Mon Sep 11 07:32:35.465 2017] CPNMS03111+ [Mon Sep 11 07:32:51.385 2017] CPNMS03111+ [Mon Sep 11 07:33:17.725 2017] CPNMS03111+ [Mon Sep 11 07:33:42.575 2017] CPNMS03111+ [Mon Sep 11 07:34:03.485 2017] CPNMS03111+



Altitude history

Decayed on March 3, 2018 (74 days)

STARS-Me

Space Tethered Autonomous Robotic Satellite-Mini elevator

Demonstration of Space Orbital Elevator



Mission

System design for 2 CubeSats & Climber
Deployment of a hard tape tether (convex)
Climber translation on the tether

Operation sequence

- (1) Release from the ISS
- (2) Attitude control
- (3) Tether deployment
- (4) Climber translation



Mission image

Launch configuration > Antenna deployment *automatically By ground commanding* > Tether extension > Climber translation



Structural system

- CV Cube: 3.5m tether extension & climber translation
- HT Cube: 10m convex tape tether deployment control
 with parameters of speed & time or length.
- Bas system is same in CV & HJT





CV Cube (climber)

HT Cube (Tether deployment system)

Bas system

Mission system

Docking condition



Antenna (developed by Kuwahara Lab. in Shizuoka univ.)



Climber and Tether deployment device









Go to Space

- 10/07/2018: STARS-Me Flight Model was completed and "Tenryu" was named for nickname.
- 06/08/2018: Shizuoka University handed over STARS-Me to JAXA at Tsukuba Space Center.
- 21/08/2018: STARS-Me was shipped to Tanegashima Space Center by JAXA.





- 23/09/2018: STARS-Me was launched by the H-IIB rocket at 2:52:27(JST)
- 06/10/2018: STARS-Me was released from the ISS at 17:00(JST).

CW beacon during the initial phase



 Stars-Me
 10/14
 15:10
 S2
 S2
 D
 D
 D
 D
 9

Mission CPU wake up









1U CubeSat Almost as same as CV of STARS-Me

