

IAF ASTRODYNAMICS SYMPOSIUM (C1)
Attitude Dynamics (1) (8)

Author: Dr. Dmytro Faizullin

Institute for Q-shu Pioneer of Space, Inc. (iQPS), Japan, d.faizullin@i-qps.com

Dr. Masahiko Uetsuhara

Institute for Q-shu Pioneer of Space, Inc. (iQPS), Japan, m.uetsuhara@i-qps.com

Mr. Ryosuke Takahira

Institute for Q-shu Pioneer of Space, Inc. (iQPS), Japan, r.takahira@i-qps.com

Mr. Junichi Murayama

Institute for Q-shu Pioneer of Space, Inc. (iQPS), Japan, j.murayama@i-qps.com

Mr. Masaru Katayama

Japan, katayama@fa-struct.com

Dr. Shunsuke Onishi

Institute for Q-shu Pioneer of Space, Inc. (iQPS), Japan, shunsuke@i-qps.com

Prof. Tetsuo Yasaka

Institute for Q-shu Pioneer of Space, Inc. (iQPS), Japan, tetsuo.yasaka@gmail.com

ATTITUDE DETERMINATION AND CONTROL SYSTEM FOR THE FIRST SAR SATELLITE IN A
CONSTELLATION OF IQPS**Abstract**

Earth remote sensing has great importance for economics, military and defence, disaster management. There are already a lot of satellites with optical and radar technologies in orbit. However, a request for high resolution with frequent revisiting remote sensing is existed. It is important for infrastructure management, marine and fishery, agriculture, autonomous driving, etc. Synthetic Aperture Radar (SAR) technology have advantages for these purposes: no dependence from weather and light conditions for performing monitoring required locations. A project for building a constellation with 36 SAR satellites was started by Institute for Q-shu Pioneers of Space, Inc. (iQPS). It is planned to perform Earth monitoring with 10 minutes interval. IZANAGI satellite, the first satellite in the constellation, was successfully launched on December 11, 2019. The satellite combines compact size, light weight (100kg) and high resolution (1m). An attitude determination and control system (ADCS) is one of key subsystems for a satellite mission success. The importance of the subsystem considerably increases when the main payload is SAR. It requires high precision and stability of attitude pointing ($<0.1\text{deg}$) to a commanded direction for performing SAR observation and also for Ku band data downlink. This work will describe 1) IZANAGI's ADCS overview, 2) initial, safety and nominal operation modes, 3) software/hardware in the loop testing with the use of AGI Systems Tool Kit (STK), 4) lessons learned to be implemented in the 2nd satellite of the constellation (planned to be launched in the 2nd part of 2020).