宇宙用真空装置を用いたインフラサウンドセンサーの較正実験
Calibration experiment for infrasound sensors by a space chamber

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Infrasound monitoring is important for atmospheric study and disaster prevention for destructive geophysical events such as volcanic eruptions, thunderstorms, landslides, tsunamis, etc. We have been developed a kind of infrasound sensor in our laboratory since 2007, then most recently, a combined type infrasound sensor was successfully developed, collaborating with a company of *RESONA ALES* in 2015. At a time of infrasound sensor construction, precise calibration with simulated infrasonic waves is significant for evaluation. Here we introduce a method of calibrating infrasonic waves with precise pressure amplitude and frequency with using a space chamber in laboratory. The space chamber is usually used at a scene of testing rocket-borne instruments and satellites in extremely severe rarefied environment before the launch with using multiple vacuum pumps to create space environment in laboratory. However, we use the chamber as an extremely rigid volume without having any surrounded surface change during the calibrating experiments. The infrasound is understood as pressure waves in the atmosphere, thus the same kind of waves can be simulated if we inject a fixed small volume into the fixed amount of atmospheric volume enveloped by the rigid chamber. The simulated pressure level can easily be calculated by using a ration between the injected small volumes per the large amount of enveloped space. A small space chamber in Kochi University of technology (KUT) with 240 litter volume was used for this kind of calibration with a small syringe with giving $1/10^8$ of the 240 litter per a fixed time constant. The syringe can be accurately controlled by a motor-driven push-pull motion mechanics with a long time period up to 1000 s. Therefore, sinusoidal pressure waves with a pressure level of 0.001 Pa as well as extremely slow frequency of 0.001 Hz was realized for calibration. By using such facilities in KUT, precise calibration with the developed infrasound sensor as well as any other infrasound sensors, microphones, and barometers can be realized. In this paper, calibrating datasets for various types of sensors will be shown.

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