



Contribution ID: 10

Type: **not specified**

A pulse tube cryocooler driven by the superconducting linear compressor at 50 Hz

Tuesday 12 December 2017 13:20 (30 minutes)

A Stirling-type pulse tube cryocooler (PTC) with a superconducting linear compressor (SCLC) unit was developed and tested. The compressor was able to produce alternating mass flow and oscillating pressure at low temperature environment near 80 K, and transmitted expansion work efficiently to the cold-end of the pulse tube. In the previous research, the compression efficiency of the compressor made of copper coil turned out to be high. However, the superconducting linear compressor can improve the system efficiency by eliminating the Joule heating loss of the conventional coil. The first attempt of superconducting linear compressor did not attain the expected high efficiency. According to the analytical model results, it is evident that the AC losses excessively occur in the extra copper portion of the superconducting coil structure and these account for the large proportions of the total compressor losses. We, therefore, have focused on trying to reduce extensively the AC losses of the superconducting linear motor to utilize its potential merit. The superconducting coil was modified by replacing the extra copper portion with G10 structure to reduce the AC losses. The PTC system, being assisted by the more efficient linear compressor, generated more cooling power at 20 K than that of our previous system. This research paper reports the improvement process of the thermal performance of the entire PTC system in the aspect of compression efficiency of the SCLC unit.

Primary author: Mr KIM, Bokeum (KAIST)

Co-author: Prof. JEONG, Sangkwon (KAIST)

Presenter: Mr KIM, Bokeum (KAIST)

Session Classification: Session VI