



Contribution ID: 479

Type: **Contributed Oral Presentation**

Development of HTS induction/synchronous drive motor aiming for low carbon emission transportation systems

Tuesday 30 June 2015 16:30 (15 minutes)

Our research group has developed 20 kW class High Temperature Superconductor (HTS) Induction/Synchronous Motor (HTS-ISM) for the realization of low carbon emission transportation systems, such as ship, train, bus, track, middle sized automobile. We have developed (1) high efficiency and high torque density HTS-ISM, (2) optimal operation code for the variable speed and/or torque control, (3) low thermal invasion and small sized cryostat and (4) high efficiency stirling-type cryocooler.

It was shown that the fabricated motor could realize rated output power of 20 kW at the synchronous mode rotation (1800 rpm). Furthermore, the motor showed the slip mode rotation with the output power of 26.8 kW, and this result indicates the realization of so-called "overload tolerance". The fabricated motor was also operated for the variable speed control, and the rotation stability was successfully clarified. Current status of Stirling-type cryocooler development is also to be presented and discussed.

This work has been supported by Japan Science and Technology Agency under the program of Advanced Low Carbon Technology Research and Development Program (JST-ALCA).

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Session Classification: C2OrH - Cryogenics for Power Applications, Energy, Fuels and Transformation II

Track Classification: CEC-09 - Cryogenics for Power Applications, Energy, Fuels and Transportation