Our group has developed a fully high-temperature superconducting induction/synchronous motor (HTS-ISM) for ship propulsion, bus, and electric vehicles. The stator winding and squirrel-cage rotor winding are fabricated by HTS conductors.

**Advantages:**
- Coexistence of slip and synchronous modes.
- High efficiency for variable speed control.
- High torque density.
- Robustness against overload.

**Objectives:**
- Performance comparison of fully HTS-ISM with different HTS stator winding configurations, such as concentrated winding, distributed winding, and toroidal winding, are lack of attention.
- The current transport property of HTS coils in different stator winding configurations are lack of consideration.

**SIMULATION AND COMPARISON**
Performance of fully HTS-ISM with three kinds of stator winding configurations are compared based on 2-D FEA simulations. The material of stator as well as rotor winding is Bi-2223 tape. The input current is 50A, the frequency is 50 Hz, and the slip is 0.002.

**INFORMATION**

**FUNDAMENTAL ROTATION PRINCIPLE**

The fully HTS-ISM possesses both of the synchronous mode and the slip mode.

**Influence on the current transport property of an HTS tape**
To improve the current transport property of HTS coils, it is necessary to reduce the perpendicular component of magnetic flux density.

**CONCLUSION**

- The rotating performance and current transport property of HTS coils of fully HTS-ISM with different stator winding configurations are compared.
- The fully HTS-ISM with toroidal winding has larger torque density, low torque ripple. Moreover, the toroidal winding can have the smallest perpendicular component of magnetic flux density, so as to have the largest current transport capacity of HTS coils.