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## **M2Or4A-03 [Invited]: Coolant Transfer Coupling for a Rotor Carrying HTS Windings**

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Superconducting synchronous machines mostly employ HTS field excitation windings on the rotor operating at cryogenic temperature. These windings are usually cooled by coolant supplied from a stationary source to the rotor with rotary couplings. Closed loop gaseous helium couplings have been employed on mega-watt size machines operating at both low speed and high speed. However, these couplings were marred with leaking of cryogen out of the closed loop and needed periodic replenishment. This undesirable problem has been recognized long ago but no suitable solution has emerged in the open literature. Currently, the HTS machines are being considered for the aerospace applications, wherein leakage of cryogen from closed loop is highly undesirable. This paper presents a concept that prevents the cryogen leakage and/or collects it for returning to the closed cooling loop. We explore the option to include an HTS dynamo to provide the field excitation and examine the possibility of maintenance free option through removal of rotating couplings. This concept would need to be de-risked before using it in the motors and generators for the aerospace applications. Possible cryogens for cooling include gaseous helium, Neon, H<sub>2</sub> and N<sub>2</sub>.

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