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# Temperature dependent behaviour of a barrel-type HTS dynamo

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HTS dynamos are a class of superconducting flux pump, which have attracted significant recent interest as novel current sources for HTS magnet coils. They employ a series of permanent magnets which mechanically traverse a coated conductor stator, giving rise to a time averaged output emf. Previous work has shown that the maximum achievable output current of an HTS dynamo is determined by the width of the coated conductor stator wire. This presents the question – what happens if a topologically-continuous stator is employed which does not have well-defined edges? In this work we report on the experimental characterisation of an HTS dynamo employing a cylindrically-continuous HTS stator, which is excited by a concentrically mounted rotor containing a permanent Nd-Fe-B magnet. The entire device is mounted in a temperature controlled cryo-cooled vacuum chamber, enabling characterisation of dynamo performance at temperatures down to 40 K. We find that device temperature affects the optimum operating speed of the device, but has little effect on the maximum current which can be achieved. Our results also indicate that this device architecture is capable of achieving output currents exceeding 1 kA, whilst incurring minimal thermal losses. This opens the tantalising possibility of kA-class power supplies for cryo-cooled benchtop magnets.

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