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Control the Output of an HTS Dynamo with a DC Background Field

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We have proposed a novel method to adjust the magnitude and direction of current in the second generation(2G) high temperature superconducting (HTS) coil by providing a strong constant magnetic field. This method can be contactless used in a variety of flux pump devices, such as linear-motor type flux pump, rotating flux pump and so on. We have redesigned the experimental device on the original basis and added a multi-turn (N=3000) DC coil with an iron core that provides a constant magnetic field. The focus is on the relationship between the background constant magnetic field, AC traveling wave characteristics and the open circuit voltage of the superconducting stator. It is found that when a constant magnetic field opposite to the magnetic field of flux pump is added in the continuous current mode, the magnitude and even direction of superconducting coil current in 77k liquid nitrogen will change, and this change can be controlled. This article introduces the application of the new device in controlling the magnitude and direction of HTS coil current. The non-contact and controllability of this method is very meaningful, and it can also provide some theoretical support for the practical application of flux pump.

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