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A New Structure for the Coaxial Magnetic Gear with HTS Bulks

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Magnetic gear (MG), as a kind of non-contact transmission component, has many advantages, such as no friction, oil-pollution free, low maintenance and easy installation, and so on. This paper proposes a novel coaxial magnetic gear (CMG) with eccentric permanent magnet structure and unequal Halbach arrays for achieving sinusoidal air-gap flux density and high output torque. The proposed model has a high temperature superconducting (HTS) bulks to replace the epoxy resin in the conventional stationary ring. According to the Meissner effect and one-sided field, the HTS bulks could enhance the modulation effect. The permanent magnets (PMs) on the inner and outer rotors are distributed in Halbach array, in which the PMs are arranged regularly on the outer rotor and the inner rotor is eccentric structure. So the inner non-uniform air gap can be obtained. The proposed model with the pole pairs of 4 and 17 for the inner and outer rotors is established, using finite element analysis (FEA) a calculated torque is up to 350.8N·m. It is 2.16 times the torque of conventional CMG.

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