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# Optimization of 2G HTS Current Leads Working at External Magnetic Field

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Current leads with use of high temperature superconductors (HTS) permit to reduce sufficiently heat transfer to liquid helium in many superconducting magnets applications. They are one of the widest HTS applications. For example, in Large Hadron Collider more than 3000 units of such current leads are used providing sufficient saving of heat transfer to liquid helium. HTS current leads made of 1G HTS tapes are considered for ITER magnet system as well. In most cases the HTS current leads are working in a self-field being removed from the area of a scattered magnetic field generated by a magnet. However, in certain cases with a tight cryostat space it could be necessary to place current leads close to the magnet into an external magnetic field of a magnet. Some specific optimization of current leads in such a case is necessary. We are participation in the project in which due to space restrictions the limited size of a cryostat demands placing horizontal HTS current leads in magnetic field ~2 T. In this paper, we performed the optimization study of HTS current leads used 2G HTS tapes and able to work in the magnetic field up to 2 T. The optimal parameters of the current leads have been determined using numerical simulation. In order to approach the maximum efficiency, it is necessary to have a very good heat exchange between the current leads and evaporating helium gas. The impact of the external magnetic field on the heat leak from current leads into liquid helium has been studied.

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