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Design of the Conduction-cooled YBCO Magnet for a MW Class Induction Heating System

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Abstract—With the power conversion device proposes greater efficiency and higher power, the new HTS induction heating equipment shows a wide application prospect in the future in the field of metal material through heating treatment. Efficiency analysis for the traditional induction heating and new structures for the HTS induction heating are studied in this paper. Calculation models for induction heating system electromagnetic field and billet region temperature field analysis are established. The MW class conduction-cooled YBCO magnet system is designed. The magnet consists of an iron core and HTS coils wound with the spliced YBCO-coated conductors. The magnet system is cooled by two AL325 GM refrigerators with the pluggable structure and the operating temperature is 20~30 K. Furthermore, the prototype YBCO coils with the same thickness are fabricated and tested to evaluate the performance of conduction-cooled YBCO magnet. In this paper, test results of the prototype magnet are presented.

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