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The Calculation of Electromagnetic Force In Crystallizer About Using The High-temperature Superconducting Electromagnetic Stirring Device

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The purpose of applying electromagnetic stirring was to change the flow field of molten steel in crystallizer during the solidification of casting blank, ultimately improving the quality of the steel. The strong static magnetic field was generated by the high-temperature superconducting magnets and rotated outside the crystallizer. The molten steel cut the magnetic line in the crystallizer to form eddy current and Lorentz force which could exert high magnetic binding force, high stirring force and high damping force on the molten steel. The superconducting electromagnetic stirring technology could constrain the form of molten steel and reduce contacts between the molten steel and the crystallizer. Using the high-temperature superconducting electromagnetic stirring device can reduce the center segregation, the loose and the shrinkage of the steel and improve the quality of the steel. This paper used the finite element software to calculate the distribution of the magnetic field and the electromagnetic force. The molten steel which could flow in the crystallizer because of cutting the magnetic line and forming the torque, the whole process was calculated.

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