

论文

薄板坯连铸结晶器内钢液流场电磁制动的模拟研究

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摘要: 采用模型实验结合数值模拟的方法分析了薄板坯连铸结晶器的电磁制动过程. 在模型实验中, 测量了磁感应强度和工质锡液速度场. 在数学模型中, 使用低Reynolds数湍流模型封闭动量方程结果表明: 电磁制动能够有效地控制结晶器内流场. 随着磁感应强度的增加, 射流强度逐渐减弱直至在中途被堵截转向同时, 包括液面在内的整个结晶器内流场速度逐渐降低. 在采用带形磁场制动的情况下, 结晶器内液态金属的感应电流呈现为大范围的涡流分布.

关键词: 薄板坯连铸结晶器 钢液流场 电磁制动

ELECTROMAGNETIC BRAKING ON FLOW FIELD OF MOLTEN STEEL IN THE THIN-SLAB CONTINUOUS CASTING MOLD

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Abstract: Electromagnetic braking on flow field of molten steel in the thin-slab continuous casting mold is analyzed by mathematical modeling and experiment.Magnetic flux density and velocity of liquid Sn in the physical model are measured, and the low-Reynolds'number k-ε turbulence model is used to solve the eddy viscosity in the momentum equations. The results show that flow field in the mold can be effectively changed by electromagnetic field. With the increasing of magnetic flux density,the let stream intensity of molten steel from nozzle discharged is gradually reduced until its moved direction is changed, at the same time, the velocity rates of whole field is decreased. When the level magnetic field is used, the induced current of liquid metal in the mold is large eddy distribution in the whole flow zone.

Keywords: thin-slab continuous casting mold flow field of molten steel electromagnetic brake

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