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非正弦振动结晶器内保护渣道动态压力变化规律

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摘要: 根据结晶器振动速度变化规律和保护渣润滑理论, 建立保护渣道动态压力计算模型, 研究结晶器非正弦振动过程保护渣道动态压力变化规律, 分析非正弦振动参数及拉坯速度变化对保护渣道动态压力的影响规律。研究表明: 随着非正弦因子 α 增加, 渣道最大负压减小, 而最大正压增加, α 的最佳值约为0.2; 随着振幅和振频增加, 渣道正负压力都增加, 但正压增加程度明显高于负压增加程度, 特别是振频增加对负压的影响不明显; 随着拉速提高, 渣道最大负压增加而最大正压减小, 因此, 拉速提高应适当提高振幅并降低振频; 针对2种拉速采用的非正弦振动参数合理, 同时证明了模型的实用性和可靠性。

关键字: 非正弦振动; 保护渣道; 动态压力; 振动参数; 拉速

Variation rule of dynamic pressure in mold flux channel during non-sinusoidal oscillation process

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Abstract: According to the variation rule of oscillation speed of continuous casting mold and the lubrication theory of mold flux, a mathematical model on the dynamic pressure in mold flux channel was developed to investigate the variation rule of the dynamic pressure in a cycle of mold non-sinusoidal oscillation process. The effects of non-sinusoidal oscillation parameters and casting speed on the dynamic pressure were studied. The results indicate that the maximal negative pressure decreases but the maximal positive pressure increase with the increase of non-sinusoidal factor. The optimal value of non-sinusoidal factor is about 0.2. With the increase of frequency and amplitude of oscillation, both the negative and positive pressures increase, moreover, the increment of positive pressure is obviously greater than that of negative pressure, especially when the oscillation frequency increases, the increment of negative pressure is very little. When the casting speed increases, the maximal negative pressure increases but the maximal positive pressure decreases. Therefore, if the casting speed increases, the amplitude of oscillation needs to be increased as well as the oscillation frequency needs to be decreased properly. The optimal non-sinusoidal oscillation patterns applied to the tow kinds of casting speed is applicable, at the same time, the applicability and reliability of the model are also certified.

Key words: non-sinusoidal oscillation; flux channel; dynamic pressure; oscillation parameters; casting speed

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