A NUMERICAL ANALYSIS OF LIQUID MOLD FLUX SHAPE IN CONTINUOUS CASTING

EUN-YI Ko, KYUNG-WOO Yi

Seoul National University, Seoul, Korea

Abstract

In continuous casting, various factors such as mold oscillation, mold flux properties and casting speed influence the slab surface quality. Among them, the mold flux plays a pivotal role in heat transfer and lubrication between the mold and strand in continuous casting. In particular, the lubricating effect which is critical for efficient processing is strongly influenced by the liquid layer of the mold flux film. For this reason, many earlier studies have attempted to analyze the morphology and behavior of the liquid layer. However, it has been reported that the liquid layer is very thin, and moreover the extreme conditions surrounding it make it difficult to directly analyze through experimentation. Therefore, morphology analyses have required the calculation of geometries based on measured heat flux values. In the present study, we employ a numerical model to analyze the morphology of the liquid film from a mechanical perspective, taking into account the force balance between the interior pressure of liquid film and the ferro-static pressure. The results indicate the liquid film shape is not linear, but curved. The shape depends on the thickness at the early solidification point. With further distance between the initial solidification point and the mold, the decrease of the liquid film along the distance from top to bottom becomes more rapid.

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