TWO-PHASE FLOW IN CONTINUOUS CASTING

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When steel is continuously cast into solid steel plates through a submerged entry nozzle there is a real danger that the steel already starts solidifying at the walls. In order to prevent this, Argon is injected and a downward cocurrent bubbly flow is thus formed (Figure 1). However, when too much Argon is inserted there is a risk that there will be a change in flow pattern and an annular flow with all the Argon in the centre could be formed. This is dangerous since the steel could start solidifying again at the walls.

In order to extrapolate the data obtained on an air-water ½ scale model to the industry, one needs to know the most important non-dimensional numbers. For this reason, a second facility was available that was scaled with an additional factor of ½. Comparisons based on different similarities were already tested but none was conclusive.

In this study, it was found that the bubble distribution goes through a strong transient regime due to the presence of transverse (lift) forces coming from the sheared flow and the presence of the wall. Due to these forces, the bubbles migrate towards the centre of the tube with a speed decreasing with increasing water velocity and bubble size. For low water flow rates, a different phenomenon was found. Here, bubbles migrated towards the wall, leading to another possible frequency profile.

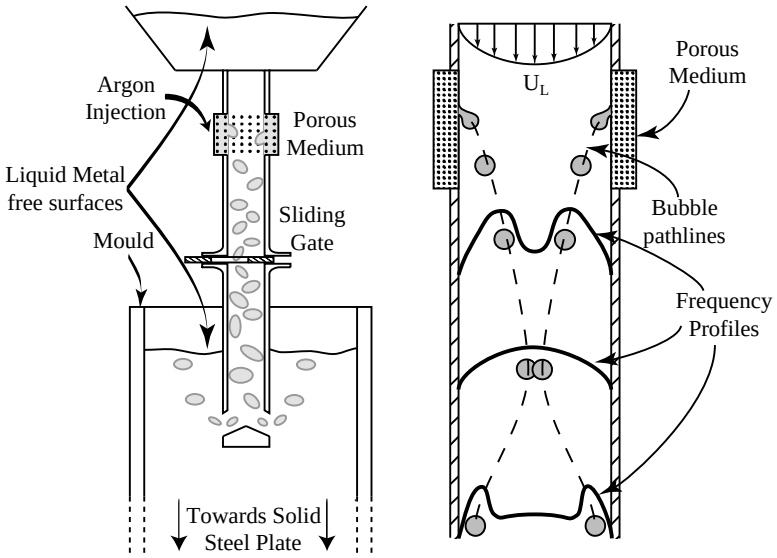

Figure 1: Left: Sketch of industrial case

Right: Transitional phenomena of bubble location