

SEMINÁRIO DE MECÂNICA

Oscillation-mark formation in the continuous casting of steel

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Abstract.

In the continuous casting of steel, solidification begins at a triple point where solid steel, molten steel and molten flux meet; understanding the motion of this triple point is of prime importance in determining how surface defects known as oscillation marks (OSMs) are formed and the profile that they adopt on the surface of the solidified steel. In this talk, I will present recent work on deriving a mathematical model that describes the relevant momentum and heat transfer for the process, and involves both surface tension at the meniscus, between the lubricant that is used to facilitate the process and molten steel, and solidification. Using asymptotic methods, a novel “moving point” problem is derived and partially solved to determine the motion of the triple point. The results are compared with experimental measurements. The analysis also tentatively suggests how the location of the triple point may be related to the two types of OSMs, fold-type and overflow-type, that generally form in practice.