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Feature formation in the planar-flow melt spinning of metals linked to meniscus unpinning ANTHONY ALTIERI, PAUL STEEN, Cornell University — In the planar-flow melt spinning of metals (PFMS), liquid metal is brought into contact with a cold, rotating wheel and thin ribbon is spun off. A unique characteristic of the PFMS process is the narrow gap region between the nozzle, where liquid metal is introduced, and the wheel, which allows for the formation of a liquid "puddle" held in place by surface tension. The flow behavior in the puddle can have a dramatic effect on the appearance of the thin ribbon product. In particular, thickness depressions which span the width of the ribbon appear periodically under certain casting conditions. These features are related to puddle vibrations of the air-liquid meniscus which forms upstream of the fluid inlet. A lower frequency (1 kHz) feature previously has been related to Rayleigh oscillations of a drop. We report that a higher frequency (10 kHz) feature, also dependent on Rayleigh oscillations, depends additionally on the translation speed of the substrate, as seen by correlation. This difference is related to meniscus pinning/unpinning and flow structures within the puddle. A model of fluid flow which connects these two features and a discussion of these differences will be presented.

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