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Capillary oscillations and periodic defect formation in planar-flow spin casting of molten metal BRENTON COX, PAUL STEEN, Cornell University — In the planar-flow casting process, surface tension holds liquid metal in a "puddle" where a thin ribbon is solidified as a product. Variations in the final thickness of the ribbon product are typically undesirable in manufacturing and are considered defects. Two similar periodic defects which appear in the ribbon product are studied and will be compared in this talk. The defect with wavelength λ of order 1 mm appears at lower pressures. In higher pressure casts, the defect with λ of order 10 mm appears. While the defect frequencies differ, they are found to scale with the same capillary/inertial time scale. It is observed experimentally that pinning/depinning on the upstream meniscus of the puddle determines which of the two defects will appear. When the upstream meniscus is pinned at the inlet aperture (constrained), the shorter wavelength defect appears. When the meniscus unpinned (free to move), the longer wavelength defect appears in the ribbon product. Instances in which the upstream meniscus may only partially pin due to imposed geometry of the inlet aperture result in coincidence of the two defects.

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