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Morphological instability of the solid-liquid interface under a thin shear flow with a free surface-ripples on icicles and stalactites[1] KAZUTO UENO, Nagoya University — Icicles and stalactites grow when their surfaces are covered with a thin film of flowing water through which latent heat of fusion and carbon dioxide are released to the surrounding air by diffusion and convection. Despite the complete difference in their basic growth mechanism, their surfaces often have ripples of centimeter-scale wavelengths. We consider the underlying common mechanism of ripple formation and find that the mean thickness of the water film and the capillary length associated with the surface tension of the water-air surface are common important characteristic lengths in determining the centimeter-scale wavelength of ripples. This is the first theoretical work on the morphological instability of solidification front during icicle and stalactite growth from a thin shear flow with one side being a free surface, in which we take into account the change of shape of the water-air surface when the shape of the solid-liquid interface is changed.

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