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**Finite-sample-width effects on chimney formation in mushy-layer convection** ANDREW WELLS, JIN-QIANG ZHONG, ANTHONY FRAGOSO, JOHN WETTTLAUFER, Yale University — The rapid solidification of a binary alloy leads to the formation of a chemically reactive porous medium, or mushy layer, within which convection and dissolution can generate *chimneys*: drainage channels devoid of solid. We combine experiment with numerical simulation to explore the influence of a finite system size on the dynamics and stability of the convective flow. For a variety of steady growth rates and cell widths, we determine conditions for chimney formation during experimental solidification of aqueous ammonium chloride in a Hele-Shaw cell. The results are compared to a two-dimensional numerical model of mushy-layer convection, providing insight into the prediction of defect formation in industrial casting processes.

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