Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Flow-induced instability of mushy layer permeability JEROME NEUFELD, JOHN S. WETTLAUFER, Yale University — The coupling of an external shear flow with the permeability of a solidifying mushy layer is investigated experimentally and theoretically. We grow a mushy layer from a trans-eutectic aqueous ammonium chloride solution from the base of a laboratory flume. The growth rate is constant and a laminar shear flow is applied. We find a threshold speed above which a spatiotemporal variation of the permeability of the layer appears with a planform wherein the long axis is transverse to the flow direction. Upon removal of the flow, the material returns to a uniform state. The growth of the pattern compares favorably with an analytical and numerical stability analysis which incorporates dissolution of the solid matrix.

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Date submitted: 09 Aug 2005 Electronic form version 1.4