

Applied Mathematics Seminar

Vertical Velocity Component for a Three Dimensional Convective Flow in a Mushy Layer with Variable Permeability

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Abstract

We consider a three dimensional convective flow in a mushy layer with variable permeability. A mushy layer is a partially solidified region formed during solidification of binary alloys. During solidification, fluid flow within the mushy layer can cause vertical chimneys or channels void of solid. These chimneys can generate imperfections in the final form of the solidified alloy. The flow in the mushy layer can be described by a system of partial differential equations including the momentum equation governed by the Darcy's law. A nonlinear evolution equation satisfied by the amplitude is derived for the hexagonal cells. Marginal stability curves for constant and variable permeabilities are presented. The linear and first order vertical velocity components for super-critical and sub-critical cases with constant permeability are illustrated. I would like to thank Professor Riahi for his continuous support on this work.

Date: Wednesday, November, 18, 2015 Time: 3:05-4:00PM
Place: MAGC 1.318

Coffee will be served. For further information or for special accommodations, please contact: Ranadhir Roy at 665-2371 or via email at ranadhir.roy@utrgv.edu