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Computation of the linear and first-order solid fractions for a magneto-convective flow in an active mushy layer.

We consider a horizontal mushy layer which is treated as an active porous media with variable permeability and in presence of a magnetic field. Solid fraction plays a crucial role in the formation of chimneys during solidification of binary alloys. The flow in the mushy layer can be described by a system of partial differential equations. Using normal mode approach, we obtain a system of ordinary differential equations for the dependent variables. We present our numerical results for linear and first-order solutions for solid volume fraction. (Received September 09, 2011)