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Dambaru Bhatta* (bhattad@utpa.edu), 1201 West University Drive, Department of Mathematics, Edinburg, TX 78539, **Mallikarjunaiah S. Muddamallappa**, Department of Mathematics, Texas A&M University, Mail Stop 3368, College Station, TX 77843, and **Daniel N. Riahi**, 1201 West University Drive, Department of Mathematics, Edinburg, TX 78539. *On Nonlinear Evolution of Convective Flow in an Active Mushy Layer.*

Here we consider the convective flow in a horizontal mushy layer during alloy solidification and based on particular set of parameters that have been used to conduct experiments. The mushy layer, which has a permeable mush-liquid interface, is treated as an active porous media with variable permeability. Using numerical and analytical methods, the solutions to the evolution equation of Landau type are calculated for both super-critical and sub-critical conditions. The results for marginal stability curve, linear and first-order solutions for the vertical velocity component and the solid volume fraction within the mushy layer as functions of space and time variables. (Received September 21, 2009)