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Dambaru Bhatta* (bhattad@utpa.edu), 1201 West University Drive, Department of Mathematics, Edinburg, TX 78539, and **Daniel N Riahi**. *Linear and First Order Solutions for a Three Dimensional Convective Flow in a Mushy layer*. Preliminary report.

Here we present the linear and first order solutions for a three dimensional convective flow in a mushy layer which is observed during solidification of binary alloys. Mushy layer is a partially solidified material sandwiched between a liquid and a solidified material. We consider a three dimensional case where mush-liquid interface is impermeable. After obtaining the basic state solutions, we find the linear and adjoint systems in terms of basic state solutions, non-dimensional parameters such as Rayleigh number, Stefan number and Concentration ratio. Then we derive the first order solutions. Numerical results of the solutions for velocity and solid volume fraction are presented. (Received September 23, 2012)