

Science and Spiritual Quest

3rd All India Students' Conference

22-23 December 2007

Tirupati, Andhra Pradesh, India

POSTER DETAILS - GUIDELINES FOR PREPARATION AND PRESENTATION

- ⇒ Dimensions: Width = 35 inch, Height = 43 inch
- ⇒ Use the font sizes given in the sample poster (a powerpoint (ppt) file). You may like to use the same page-setup that of the sample poster. Please note that the smallest size texts have to be readable from a distance of approx 1 m.
- ⇒ Presenting author has to be identified by writing his/her name "all in upper case" like: SUSHANTA SHARMA in the sample format (Format: first name / middle name / surname).
- ⇒ Write paper number "finally assigned" to your paper on the top-left side in the same position as shown in the sample poster. The final paper number assigned to every contributory paper is available on the website (<http://www.binstitute.org/aissq2007>).
- ⇒ A poster stand will have four posters on its four sides. Poster boards have been numbered as 1/1, 1/2, 1/3 and 1/4 – for poster stand 1. Similarly, for poster stand 2, boards have been numbered as 2/1, 2/2, 2/3 and 2/4.
- ⇒ In the poster schedule, against a paper, poster board allotted to it has been mentioned. A paper has to be put only at its allotted place.
- ⇒ A sample poster stand is shown at the end of this file. You can see its different view.
- ⇒ Posters will be fixed by an adhesive tape (not by glue or pins). Tape rolls will be available near every poster stand.
- ⇒ If an author is not having an access to a plotter to print a poster of the size mentioned above, he/she can have the poster made by printing the matters on A4 / A3 / A2 size papers. While doing so, sizes of the fonts have to be the same as given in the sample poster. Also in this case, all pages should have page numbers to facilitate others know the sequence.
- ⇒ For every paper, a presenting author is advised to bring at least 10 reprints of his/her work to be given to the persons interested in his/her work.
- ⇒ The presenting author has to be present near the poster for the entire duration of the particular poster session. Other authors may assist the presenting author in explaining the things.
- ⇒ Each poster will be visited by at least 100 participants. So the presenting author has to be thorough with the work to generate interest in his/her work.
- ⇒ Extension cables for electric power will not be available near any of the poster boards. No PC/lab top will be made available to anyone to give any demo of his/her work. If one wants to give demo of his/her work, he/she must use his/her laptop and run it on battery backup. For charging laptops, one will find many power points.

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POSTER DETAILS

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<http://www.binstitute.org/aissq2007/>, <http://www.binstitute.net/aissq2007/>



A sample poster-stand: four posters to be fixed in one stand

ANALYSIS OF SOLIDIFICATION OF A SEMITRANSSPARENT PLANAR LAYER USING THE LATTICE BOLTZMANN METHOD AND THE DISCRETE TRANSFER METHOD

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ABSTRACT

Solidification of a semitransparent material is analyzed using the LBM. DTM is used to compute the radiative information. Solidification occurs at a range of temperatures. Presence of a mushy-zone is considered. Formulation is first validated by solving solidification of a radiatively opaque planar material. Next, effects of various optical parameters and latent heat on temperature distribution in three zones and location of the mushy-zone are studied. They are found to have significant bearing on the results.

Radiative information

$$\frac{\partial q_x}{\partial x} = \delta_w \left(4\sigma T^4 - G \right)$$

Using the discrete transfer method

Incident radiation

$$G = 2\pi \int_0^{\pi/2} I(\theta) \sin\theta \sin\left(\frac{\Delta\theta}{2}\right)$$

$$I_d = I_\infty \exp\left(-\frac{\beta \Delta x}{\cos\theta}\right) + S_w \left[1 - \exp\left(-\frac{\beta \Delta x}{\cos\theta}\right) \right]$$

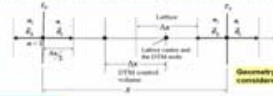
FORMULATION

1-D planar semitransparent material with constant optical properties with different thermo-physical properties for the solid, mushy- and liquid-zones, subjected to following conditions:

IC: $T(x, 0) = T_0$

BCs: $T(0, t) = T_p = T_0$

$T(L, t) = T_p = T_0$



Governing equation

$$\frac{\partial(\rho H)}{\partial t} = \frac{\partial}{\partial x} \left(-\lambda \frac{\partial T}{\partial x} \right) + \frac{\partial q_x}{\partial x}$$

Energy $H = \rho_s h_s + \lambda L$

Liquid fraction in solid, mushy and liquid zones

$$f_l = \begin{cases} 0, & H < H_s \\ \frac{H - H_s}{H_l - H_s}, & H_s \leq H < H_l \\ 1, & H > H_l \end{cases}$$

Energy equation in the LBM formulation

$$\Phi_s = \frac{L}{C} \left[\frac{f_l(x, t + \Delta t) - f_l(x, t)}{\Delta t} \right] + \sum_{i=1}^N \omega_i T(x, t) - T(x, t) - \sum_{i=1}^N \omega_i T(x, t)$$

RESULTS



CONCLUSIONS

LBM was used to analyze solidification of a semitransparent planar medium. The radiative information was computed using the DTM. Effects of various parameters on temperature distribution, liquid fraction and front location were studied. Effect of radiative parameters was found to be significant in all the cases. Linearity in temperature profile and a faster movement of the front was observed for the lower values of the extinction coefficient β , higher values of the scattering albedo ω , lower values of the latent heat L , and the higher values of the conduction-radiation parameter β . For all sets of parameters studied, the thickness of the mushy-zone was found to increase with time. It was thicker for the cases in which radiation was less dominant.

A poster fixed in the poster board 1/2 with adhesive tape