20.10.9 Extracting Detailed Radiation Data

FDS solves the radiation transport equation (RTE) using a finite volume method in which the radiation intensity is computed over a discrete number of solid angles. Because there are approximately 100 angles by default, the angle-specific intensity values are not saved in the gas phase cells—only at boundaries. However, there is a way to save these values into a file, which might be useful for transferring data to another model or diagnosing problems with the RTE. Data is saved within rectangular blocks of cells using one or more input lines of the form:

&RADF XB=..., I_STEP=2, J_STEP=3, K_STEP=1 /

This line directs FDS to write out the radiation intensity, I_{ijk}^{l}, for each cell with indices *ijk* that is bounded by XB and for each solid angle *l*.

You can skip cells using the parameters I_STEP, J_STEP, and K_STEP, each of which default to 1.

The print outs are done every DT_RADF s starting at T_RADF_BEGIN and ending at T_RADF_END, where these three parameters are listed on the DUMP line. By default:

- T_RADF_BEGIN is set to the start time of the simulation, T_BEGIN;
- T_RADF_END is set to T_END;
- DT_RADF, the time interval, is the end time minus the start time divided by 5.

Each output file is in text, not binary, format. The format of the file is shown in Fig. ??.

- NSTEPS is the number of TIMES that data is written out.
- NP is the number of points within the block designated by XB.
- XYZ_INTENSITIES are the coordinates of the NP points.
- NI is the number of solid angles, which are listed under XYZ_DIRECTIONS.

Each TIME the intensities are written out, each cell in the designated block will list its temperature in degrees K, a placeholder value of 0, and then the intensities at the NI solid angles in units of W/m².