
Tutorial 5. Modeling Radiation and Natural Convection

Introduction

In this tutorial combined radiation and natural convection are solved in a two-dimensional square box on a mesh consisting of quadrilateral elements.

This tutorial demonstrates how to do the following:

- Use the radiation models in FLUENT (Rosseland, P-1, DTRM, discrete ordinates (DO), and surface-to-surface (S2S)) and understand their ranges of application.
- Use the Boussinesq model for density.
- Set the boundary conditions for a heat transfer problem involving natural convection and radiation.
- Separate a single wall zone into multiple wall zones.
- Change the properties of an existing fluid material.
- Calculate a solution using the pressure-based solver.
- Display velocity vectors and contours of stream function and temperature for flow visualization.

Prerequisites

This tutorial assumes that you are familiar with the menu structure in FLUENT and that you have completed Tutorial 1 . Some steps in the setup and solution procedure will not be shown explicitly.

Problem Description

The problem to be considered is shown schematically in Figure 5.1. A square box of side L has a hot right wall at $T = 2000$ K, a cold left wall at $T = 1000$ K, and adiabatic top and bottom walls. Gravity acts downwards. A buoyant flow develops because of thermally-induced density gradients. The medium contained in the box is assumed to be absorbing and emitting, so that the radiant exchange between the walls is attenuated by absorption and augmented by emission in the medium. All walls are black. The objective is to compute the flow and temperature patterns in the box, as well as the wall heat flux.

Tutorial 5 Modeling Radiation And Natural Convection

Emilie Sanchez

A decorative graphic element consisting of a light blue horizontal bar with a rounded right end, and a red-to-white gradient semi-circle positioned behind the bar's end.

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8. Mass Balance Mass-balance analysis may also be referred to as. "Material Flow Analysis" or "Substance Flow Analysis." Table 8.1 provides several examples of possible inputs,. Mass Balance Approach in the Chemical Industry The

mass balance Approach (MBA) is a process for determining the use of chemically recycled or bio-based feedstock in a final product when both recycled and ... BRC 3.9.2 Trace Exercise Sample Procedure to conduct a mass balance check · 1. Select a raw material lot number used in a finished product made within the last 6 months. · 2. Review storage ... UNDERSTANDING VULNERABILITY ASSESSMENT Table 6 provides examples of PRNs for different raw materials. Table 6 Priority ... Mass balance exercises at critical points in the supply chain - the mass ... ISSUE 8 FOOD SAFETY - Frequently Asked Questions - a worked example from the raw material supplier, which ... to conduct a mass balance test every 6 months for each claim or a single mass balance test every.