Solar Dryer Exergetic and Energetic Efficiency Analysis

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Abstract

A drying chamber for dehydration purposes is simulated for heat transfer purposes and the temperature field validates a decrease in the humidity contained in the compartment. We model a chamber-chimney system allowing the movement of air through the chamber.

In this work, by coupling diffusive and heat transport phenomenon we establish characteristic parameters to increase both, the thermal and exergetic efficiency of the chamber. We include dehydration trays to consider the operational conditions of a commercial chamber. Using COMSOL Multiphysics® software in a 2D geometry we discuss the improvement of the dehydrator's performance for different geometries. A representative result for the velocity and temperature field is shown in figures 1 and 2 for a chamber with a single tray.
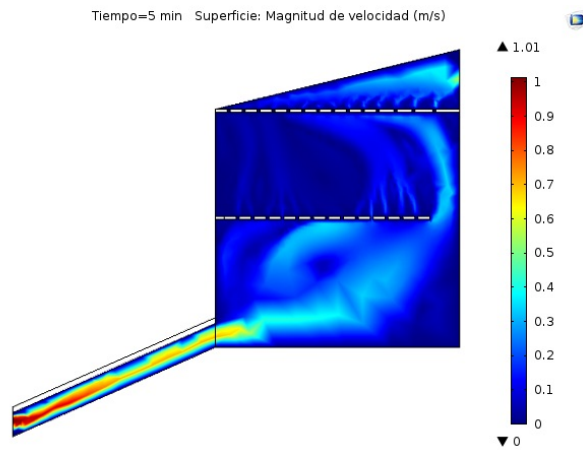
Figures used in the abstract

Tiempo=5 min   Superficie: Magnitud de velocidad (m/s)

Figure 1: Velocity field when there is a single tray in the drying chamber .

Tiempo=5 min   Superficie: Temperatura (K)

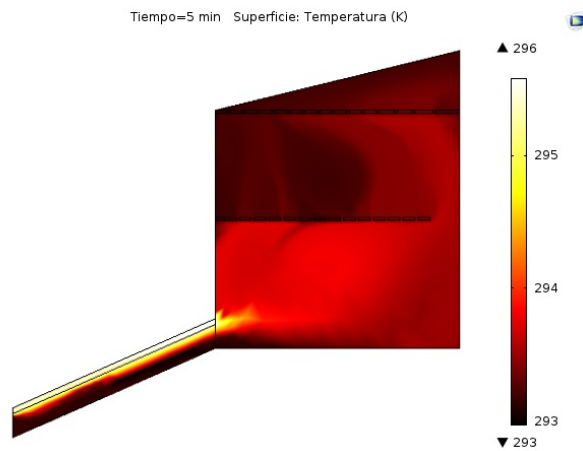**Figure 2**: Temperature field surrounding a single tray in the drying chamber.

Figure 3

Figure 4