

Modelling and simulation of heat transfer during chilling of chicken breast meat

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ABSTRACT

The poultry processing industry is increasing the production world-wide in contrast with many other meat producing sectors. In many cases the equipment used for chilling and freezing is designed empirically and is operating with inadequate air-circulation and too high energy costs. For designers it is important to apply basic knowledge about refrigeration, heat and mass transfer from meat products.

As the main items, which express the original contributions of this work, can be mentioned:

- The presentation of a critical analysis of mathematical models, concerning refrigeration and freezing processes.
- The application of a finite elements method for the calculation of heat and mass transfer of meat products refrigeration.
- The utilisation of a great performance programme like ANSYS, for studying the heat and mass transfer processes in a non-stationary regime, in non- homogeneous medium in three-dimensional variant reading.
- The achievement of an experimental model to study the heat and mass transfer at food cooling, in the Thermal Department of the Technical University for Civil Engineering in Bucharest.

This paper compares the results of some numerical calculations with experimental data. On the theoretical and numerical side the ANSYS program was used. The finite element model in axial-symmetrical reading variant was PLANE 55.

On the experimental side (see figure 1) an air tunnel was used for the chilling of chicken breast meat.

The simulated results are in good agreement with the experimental data.

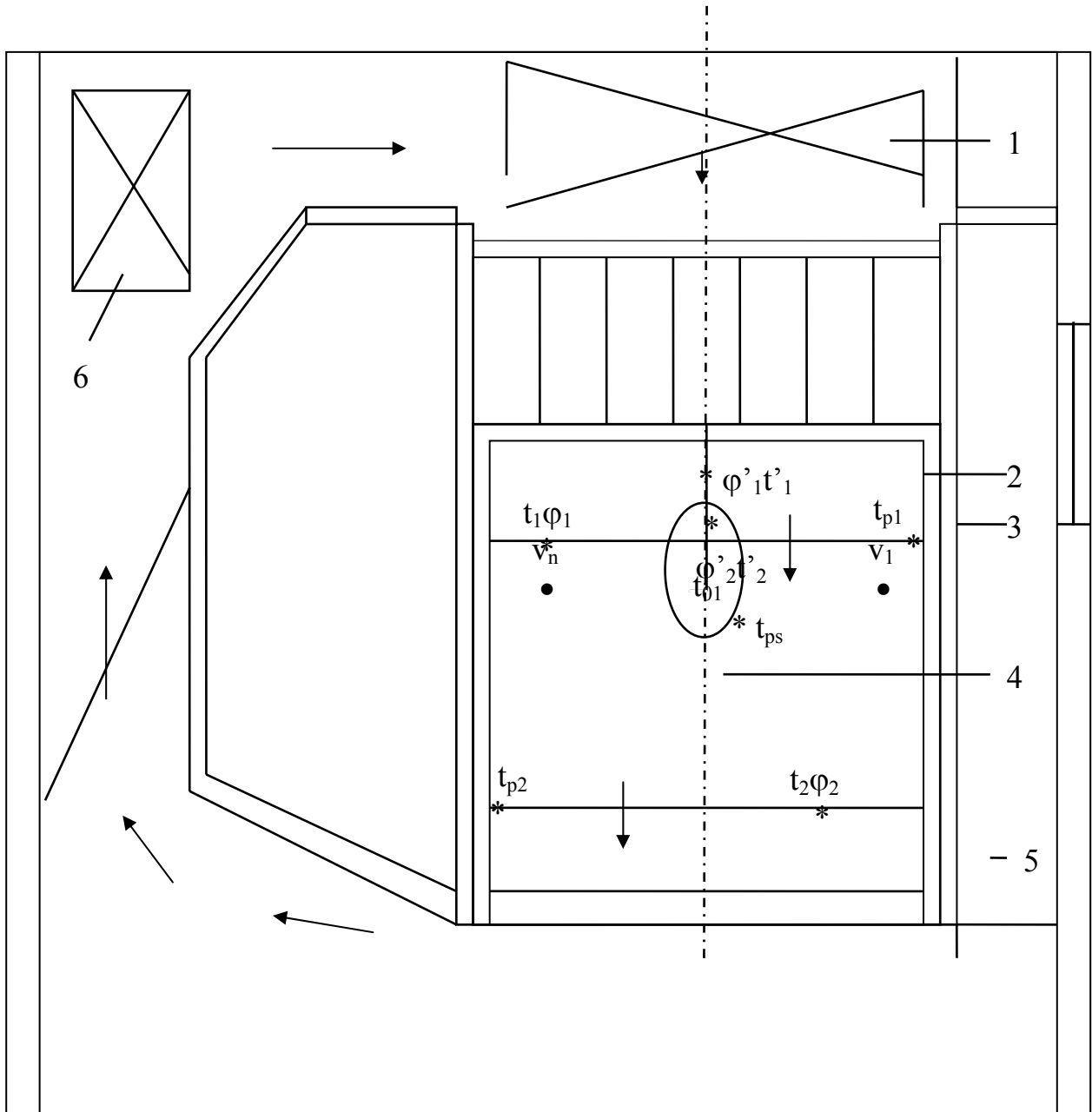


Figure 1: Test Plant at the Technical University for Civil Engineering in Bucharest

Legend:

- | | |
|---------------|-------------------------|
| 1- Fan | 4 - Chicken Breast Meat |
| 2- Isolation | 5 - Refrigerated space |
| 3- Air tunnel | 6 - Evaporator |