平板状食品冷却过程的MATLAB模拟

Simulation Study on Cooling Process of Plain Food With MATLAB

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中文摘要：

冷却是食品加工中最终温度在冰点以上的换热降温过程,对其过程的模拟具有重要的理论和实际意义。将平板状食品的冷却简化为物性不变的一维非稳态的导热过程,建立差分方程组对其进行数值求解是一个简便而有效的方法。在差分法的基础上,利用功能强大的计算软件MATLAB对冷却过程进行模拟,这种方法思路新颖、操作简便、能够化繁为简。实验表明,MATLAB模拟的关于食品冷却速率和内部温度场的变化规律与实际情况十分接近;模拟的结论为食品冷藏、冷冻的设备生产和工艺研究及其自动监测和控制提供了重要理论依据

英文摘要：

Cooling is the process by which the temperature of food is decreased to a final temperature above freezing during food processing. Simulating the process has a great significance on theory and practice. For heat conduction on a one-dimensional unstable state as during the cooling process of plain food, it is an easy and feasible method to establish differential equations to solve problems with numerical prediction. Based on finite difference methods, the cooling process is simulated with powerful MATLAB. This new method can simplify operations. Results show that rules of cooling time of food, cooling speed and inner temperature fields obtained from MATLAB is in agreement with the practical situation. The simulation provided an important theoretic basis for manufacturing equipment for chill storage and freeze storage of food, for studying technology and for automatic monitoring and automatic control.

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