

Mathematical Modeling of Skin Condensers for Domestic Refrigerator

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Abstract : A mathematical model of hot-wall condensers used in refrigerators is presented. The model predicts the heat transfer characteristics of condenser and the effects of various design and operating parameters on condenser tube length and capacity. A finite element approach was used to model the condenser. The condenser tube is divided into elemental units, with each element consisting of adhesive tape, refrigerant tube and outer metal sheet. The heat transfer characteristics of each section are then analyzed by considering the heat transfer through the tube wall, tape and the outer sheet. Variations in inner heat transfer coefficient and pressure drop are considered depending on temperature, fluid phase, type of flow and orientation of tube. Variation in outer heat transfer coefficient is also taken into account. Various materials were analysed for the tube, tape and outer sheet.

Keywords : condenser, domestic refrigerator, heat transfer, mathematical model

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