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ECONOMICAL OPTIMIZATION OF AN INDIRECT SOLAR CABINET DRYER BASED ON MATHEMATICAL MODELING

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Abstract

This paper presents an optimization procedure to minimize the cost of drying in a solar cabinet dryer based on the results of a mathematical model. The model has been developed previously for performance analysis of a solar cabinet dryer. The optimal values for geometry of the solar collector, mass flux of air through the collector, and initial moisture content are obtained in a way that the drying cost is minimized. The results indicate that to optimize the drying cost, the best values of initial moisture content, air mass flux, the length and the surface area of collector are 9–10 kg/kg (dry basis), 0.03–0.045 kg/m^2.s, longer than 2.5 m, and 2.5–3 m^2, respectively. The results can help the designers to choose the optimum drying conditions for small scale industrial applications.

Key words: cost ratio, drying cost, optimum drying, solar energy

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