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Modeling and Simulated Design: A Novel Hybrid Dryer and Dryer Design Software

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Abstract

Solar-biomass hybrid dryers are widely used as environmentally friendly alternatives to fossil fuel dryers for the preservation of agricultural food products. However, the design and optimization of hybrid dryers often involve the construction of expensive prototype systems and time consuming studies. This study presents a novel hybrid dryer model and a dryer design and simulation software which can be used to improve hybrid dryer design efficiency. The methodology adopted is that of functional analysis and mathematical modeling, with MATLAB employed to perform numerical simulations on the system and develop a dryer design and simulation interface. The software package has as main functions (a) dimensioning the hybrid dryer which comprises a solar collector, combustion reactor and tunnel drying chamber, (b) cost analysis and financial appraisal, and (c) temperature dynamic simulation in the system. The novel software has been successfully employed to dimension a hybrid dryer for drying of green pepper.

Key words: Modeling, Simulated design, Solar-biomass dryer, Design software, Food products.

1. Introduction

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