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SELECTED PAPERS FROM
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ICOM'08

Editors

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DESIGN AND ANALYSIS OF A SOLAR STILL USING FINITE ELEMENT METHOD

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ABSTRACT

The external surfaces of the evacuated multistage solar still is subjected to the atmospheric pressure while the inner surfaces are under vacuum. The structure is analyzed using MSC/ NASTRAN software. The upper stage was selected for analysis because it is subjected to the maximum pressure difference. The analysis conducted for two types of design, and stiffeners were added to support the structure. The new modified design was found to have better safety factor and less wall deflection.

Keywords: Solar still; Evacuated; Multistage; FEM; NASTRAN

1. INTRODUCTION

Desalination plants satisfy fresh water needs for many areas in developed and developing countries. For big towns desalination plants are usually coupled to the electric power generation plants. Solar energy powered desalination plants can play an important role in supplying fresh water for villages and small communities especially in developing countries, where most of the areas have a high intensity of the incident solar radiation.

The development of high yield distilled water of solar still has presented a challenge for researchers around the world and necessitates the development of more advanced concepts of solar still, focusing on multistage and evacuated solar still. Fernandez and Chargoy [1] experimentally and analytically investigated the multistage solar still, which consists of stacked array of distillation trays of w-shaped bottom that acts as a condenser for the tray below. They concluded that the multistage desalination of seawater is reliable and the undesirable flow of steam that bypasses the condenser is quite harmful to the overall performance of the still. Uda et al. [2] reported the development of an evacuated solar still. The main idea of the proposed still is due to the thermodynamic principle that represents the vapor pressure of water as monotonic function of the temperature. Essentially, reducing the pressure in a multistage solar still accelerates the evaporation process. The proposed still was tested using electric