COMPUTATIONAL FLUID DYNAMICS (CFD) SIMULATION OF QUINTUPLE EXPOSURE SOLAR OVEN

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ABSTRACT

Solar ovens or commonly known as solar cookers are used primarily to cook food and heating water. Furthermore, additional uses are continually being developed. However, there are many factors that affect to people's approach their research and create new technology in solar development. The objectives this study is to determine the distribution of temperature air inside of solar oven during a day. To approach the new design and model of solar oven (act as solar collector) by using quintuple surface glass plate is drawn and meshing using CAD software (CATIA V5R17). The simulated and analyzed is using computational fluid dynamics (CFD) software (STAR-CCM+ 3.06.006). The volume averaged temperature of air inside is compared with theoretical results. There is a good agreement between the theoretical and simulated results for volume averaged of air temperature. It was found that the temperature is high in the case for solar irradiation high but the density of air inside opposite to the temperature results. Although there are some small discrepancies due to some experimental imperfectness matters, we still have a good confidence in the CFD simulation program that can be used in the future for more complex solar cooker (solar collector) problem.

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