

عنوان مقاله:

Effect of Inclined Angle on Pattern of Free Convective Airflow Inside the Cavity of Parabolic Solar Collectors

محل انتشار:

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خلاصه مقاله:

In the present paper, the effect of inclination angle on the free convection airflow inside the cavity of compound parabolic collectors and also on the performance of the thermal system is examined. In the analysis, airflow equations for computations of velocity, pressure, and temperature fields and the conduction equation for obtaining the glass cover and absorber tube temperatures are solved by the finite element technique using the COMSOL multi-physics. For this purpose, the well-known $K-\epsilon$ turbulent model is employed with the Reynolds average Navier Stokes scheme. Theoretical findings reveal that the pattern of air-free convection flow and also the temperature distribution are much affected by the collector inclination angle, such that the symmetric bi-cellular air flow at zero inclined angle changes to two non-symmetric recirculated zones at a large value of the tilt angle. This phenomenon causes a slight increase in thermal efficiency and leads to a more uniform air temperature distribution inside the collector. Numerical findings are validated by comparison with experimental data published in the literature.

کلمات کلیدی:

CFD, Compound Parabolic Collector, inclined angle, Natural convection

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