

Abstract

In this work a cylindrical solar concentrated collector with an electronic tracking system is designed, manufactured and study the performance of experimental performance study for it is also made.

The system was consisting of two parts:

1. The mechanical parts, which is consist of affixed steel structure for holding the moving structure. A specular Nickel reflector is fixed on the movable structure. The reflector is formed in a parabolic shape for reflecting the sun rays to focus line. In the focus line a 2.5 cm diameter and 2.5 meter length copper tube is set for receiving the reflected radiation. The copper tube is electroplated by black copper oxide (Cu O) in order to increase the absorbed energy and reducing the emitted energy. The water is used as a working fluid to calculate the useful energy by using the energy equation.
2. The electronic part: This is consisting of photo sensors with variable resistance change inversely with solar radiation incident upon it. The photo sensors are fixed on the movable structure of the mechanical parts.

Also number of measuring was used like thermometers, flow meter and solar intensity meter and photo for sensing the sun rise and sun set.

The performance study of the solar concentrator with tracking system was done in KUT city (32.30° North latitude). The study is included four states. The states are:

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1. Fixed state, where the solar concentrator is located in a fixed position (vertical position with the solar ray at 12 AM).
2. Moving state around North - South tracking axis.
3. Moving state around East - West tracking axis.
4. Moving state around horizontal tracking axis's with angles (22.5° , 45° , 67.5°) from the North – South axis.

The results showed:-

1. Higher hourly efficiency for concentrating collector while tracking the direction of the axis (North - South) was (44.215) during June in (17/6/2012) at noon (11:58 a.m).
2. Higher hourly efficiency for concentrating collector while tracking the direction of the axis (East - West) was (43.99) during June in (15/6/2012) at noon (11:58 a.m).
3. Higher hourly efficiency for concentrating collector while tracking Towards horizontal angles ($22.5^\circ - 45^\circ - 67.5^\circ$) was (47.861) at the angle (67.5°) during July in (21/7/2012) at noon (12:03 p.m).