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1 **Experimental and analytical thermal analysis of cylindrical cavity receiver for solar dish**

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11 **Abstract**

12 In this paper, an experimental and analytical study of various parameters which affected the
13 thermal efficiency as well as total heat loss of solar cylindrical cavity receiver for solar dish is
14 presented. The downward facing receiver having a depth of 20 cm, inner diameter of 10 cm
15 and 19 helically turns of copper tube thermally insulated has been designed. The wind speed
16 effect was not taken into account in the experimental tests which are conducted under a solar
17 irradiation of 957 W/m² and a receiver inclination angle of 36° which corresponds to the
18 experimentation site latitude. The developed analytical model is based in its structure on the
19 different Nusselt number correlations suggested to evaluate the convective and radiative heat
20 losses through the cylindrical cavity. Then, the model makes it possible to predict the total
21 heat loss in order to determine the receiver thermal efficiency under a given inclination angle.
22 The experimental and analytical thermal efficiency estimations agree reasonably well with a
23 maximum deviation of about 12%.

24 **Keywords:** cylindrical cavity receiver, heat loss, Nusselt number correlation, analytical investigation

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