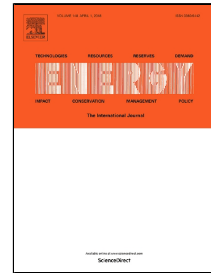


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Experimental and Numerical Study on Dish Concentrator with Cubical and Cylindrical Cavity Receivers using Thermal Oil

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1 **Experimental and Numerical Study on Dish Concentrator with** 2 **Cubical and Cylindrical Cavity Receivers using Thermal Oil**

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9 **Abstract**

10 In this study, a parabolic dish concentrator with two types of cavity receivers was investigated.
11 The designed experimental setup included a parabolic dish concentrator, cavity receivers, a heat
12 exchanger system, and hydraulic circuit unit. Two optimized shapes of cubical and cylindrical
13 cavity receiver were made and studied. Also, numerical modeling was developed for predicting
14 the cavity receiver performance. The numerical results of the cavity receivers show a good
15 agreement with the experimental results. The results indicated that the receiver heat gain and
16 thermal efficiency of the cavity receivers had a similar trend compared to the temperature
17 difference of the heat transfer fluid between the inlet and outlet of the cavity receivers. The
18 results also clarified that the thermal efficiency of the cubical cavity receiver was higher than the
19 thermal efficiency of the cylindrical cavity receiver in the steady-state period. The average
20 thermal efficiency of the cubical and cylindrical cavity receiver was obtained as 65.14% and
21 56.44% in the steady-state period, respectively. The cubical cavity receiver can be recommended
22 for an efficient heat gain, in comparison with the cylindrical cavity receiver based on the
23 conducted experimental tests on 12 October, and 26 September 2016.

24 **Keywords:** Experimental analysis; cubical and cylindrical cavity receivers; energy analysis;
25 thermal oil; solar parabolic dish.

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