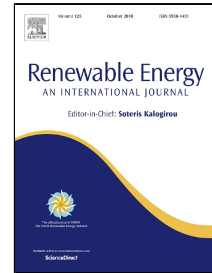


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Solar Photovoltaic based Air Cooling System for Vehicles

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10 **Abstract:** The conventional automotive air conditioning system was driven by internal
11 combustion engine or power battery, which increased the oil consumption and vehicle
12 carbon emission. In this study, a direct current (DC) air conditioning system powered by
13 solar photovoltaic module (PV) has been designed to solve the problem of temperature
14 increasing inside the vehicle when stops in the broiling summer. The purpose of this work
15 is to design a whole DC air conditioning system with R134a as refrigerant, replacing the
16 power source with solar energy. The result shows that the environmental condition in the
17 vehicle has obviously improved by the DC air conditioning system, meeting the
18 requirements of human bodies. In addition, in the experiment, the minimum refrigerating
19 capacity should be $\square 1500$ W, maintaining the thermal equilibrium inside the vehicle under
20 the sun blazing, when the vehicle stops and no person inside. The work will prompt further
21 research of solar energy and development of solar electric vehicle air conditioning system.

22

23 **Keywords:** DC air conditioning system, refrigerating capacity, temperature variation, heat
24 of radiation and convention

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