A MATHEMATICAL MODEL FOR SOLAR ASSISTED AUTOMOBILE A/C BASED ON ABSORPTION REFRIGERATION SYSTEM

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ABSTRACT

Most conventional air-conditioning (AC) systems used in vehicle are driven by fossil fuel combustion, and therefore give raise emission of environmentally damaging pollutants. In addition, conventional cooling systems increase the load on the engine therefore increase the fuel consumption. In general vehicle is used, on average, about 249 hours annually or about 41 minutes per day, 365 days a year. Estimates of air-conditioning use range from 107 to 121 hours per year or 43% to 49% of vehicle usage. An air conditioner compressor can add up to 5-6 kW peak power draw on a vehicle's engine. This power draw is equivalent to a vehicle driving steady state down the road at 35 mph (56 km/h).

In this research a detailed thermodynamic analysis of water/lithium bromide absorption refrigeration cycle is performed, in specific operational conditions compatible with the nature of the weather in most areas of Saudi Arabia ($30 \leq Ta \leq 50, 5 \leq Te \leq 15, 80 \leq Tg \leq 120$), and under cooling load compatible for large size vehicle(5 kW), and a mathematical model of solar assisted automobile A/C based on absorption refrigeration system was been deduced.

KEYWORDS: Air-Cooled Absorption System, Solar Radiation, Absorption, Water-Lithium Bromide, Vehicle Emission Gases, Saudi Arabia Transportation Road Sector