

An Investigation of System and Operating Parameters on the Performance of Parabolic Trough Solar Collector for Power Generation

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Abstract : The authors investigate the effect of system and operating parameters on the performance of high temperature solar concentrator for power generation. The effects of system and operating parameters were investigated using the developed mathematical expressions for collector efficiency, heat removal factor, fluid outlet temperature and power, etc. The results were simulated using C++ program. The simulated results were plotted for investigation like effect of thermal loss parameter and radiative loss parameters on the collector efficiency, heat removal factor, fluid outlet temperature, rise of temperature and effect of mass flow rate of the fluid outlet temperature. In connection with the power generation, plots were drawn for the effect of (TM-TAMB) on the variation of concentration efficiency, concentrator irradiance on PM/PMN, evaporation temperature on thermal to electric power efficiency (Conversion efficiency) of the plant and overall efficiency of solar power plant.

Keywords : parabolic trough solar collector, radiative and thermal loss parameters, collector efficiency, heat removal factor, fluid outlet and inlet temperatures, rise of temperature, mass flow rate, conversion efficiency, concentrator irradiance

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