

Abstract

Solar energy is a primary source of energy which is vital for maintenance of the earth system. Solar flat plate collectors have been one of the major innovations for converting solar energy into usable energy form. The most wide spread thermal use of solar energy, has been for water heating system, which have been commercialized in many countries in the world. Now a day, plenty of hot water is used for domestic, commercial and industrial purposes. Various resources i.e. coal, diesel, gas etc., are used to heat water and sometimes for steam production. Also the use of electric heaters to heat water have become very traditional and for which a lot of electricity is consumed. Solar energy is the main alternative to replace the conventional energy sources. The solar thermal water heating system is the technology to exploit the plenty amount of free available solar thermal energy. The solar thermal system is designed to meet the energy demands. The size of the systems depends on availability of solar radiation, temperature requirement of customer, geographical condition and arrangement of the solar system, etc. A design and development of an automatic temperature controller for a solar water heating system is very much essential because it will provide constant temperature water at the delivery load automatically. During fluctuating solar insolation, a solar collector may not be able to heat the water up to the desire temperature and so to compensate this an electric heater has to be incorporated with the system. In this system, two storage tanks are used. One is connected to the solar collector directly along with an electric heater which acts as a primary source and the other is disconnected from the collector which acts as a secondary source. But these two tanks are connected together at the delivery outlet through the T-joint. Thermocouples are inserted at the outlets of the primary tank, secondary tank and delivery outlet to monitor the water temperature at that instant of time. A valve (secondary) connected at the outlet of the secondary tank is to be controlled in order to get a constant temperature at the delivery outlet throughout its use. With this system, the cost for the electricity reduces to a great extent and also the user is able to get desired hot water throughout its use. The required flow rate for the secondary valve to maintain a constant temperature is calculated using a software called MATLAB.