Abstract

Solar energy has a great potential for the future; it is free, its supplies are unlimited, it does not pollute the environment and cannot be controlled by one industry. Currently, the use of solar energy as an alternative source through solar radiation is seriously constrained by low efficiency of solar cells. In solar chimney, as air density inside the system is less dense than that of the environment at the same height, natural convection affected by buoyancy which acts as driving force comes into existence. All models so far developed have only considered constant driving pressure systems. But there are also non constant driving pressure systems whose pressure driving force have not been investigated. The objectives of this study were to determine the effect of constant and non constant pressure driv- ing force in a solar chimney power plant and to assess the effect of air velocity on the power output for constant and non constant pressure driving system. Methodology used include the use of mathematical equations of continuity, momentum and energy which were solved numerically using finite deference method. The effect of the driving force on power output was determined through graphs. The highest temperature and velocity in the chimney, of 19^0C and 10m/s, respectively were used to estimate the driving force and power output in a solar chimney power systems. An- other result obtained is that the higher the driving force, the higher the power output. The results were validated by measurements from other models. The implementation of this study is of great significance for the development of new energy resources and the commercialization of power generating systems. It may help developing countries to promote rapid development of the solar hot air-flows power generation.