

Design and Experimentation of Electromechanical Heat-Gaining Panel to produce energy by using multi-thermoelectric generator modules

Hiba ali Hussein¹, Zhonglai Wang*²

^{1,2}*School of Mechanical and Electrical Engineering, University of Electronic since and Technology of China, Chengdu 611731, China, wzhonglai@uestc.edu.cn, 008615881043536*Corresponding author*

Abstract: Thermoelectric generators (TEGs) panel is used to produce electrical energy by converting thermal energy into electrical energy depending on the temperature differences (ΔT) between the two sides of the panel, which can generate electrical power over 24 hours for different climate conditions (hot, cold, wet or dry). The TEGs panel was designed using Solidworks and the prototype of the TEGs panel was carried out in this study for practical testing and evaluation. The TEGs panel performances and the limitation, including parameters such as power generation, efficiency, response time was studied. In this study, the TEGs panel was exposed to sunlight and cubic ice to consider temperature variations throughout the day. The results showed that the TEGs panel generates electric powers of 8.04437 W and 80.40171 W during the cubic ice and sunlight tests, respectively, for temperature differences (ΔT) of 18°C and 3.3°C. The electric power from this test can be used to charge a small mobile phone. It was indicated that the theoretical results by the MATLAB program are closely resemble the laboratory results. Furthermore, the correction ratio for the power of MATLAB validation was 6.59%, while the correction ratio for the efficiency was 5.46%. The response time of the system was ranged from 2 to 6 minutes, which it is indicating the time needed for the TEGs panel to respond effectively to changes in temperatures. After incorporating the correction ratios from MATLAB simulation, the results showed that the maximum electric power and a maximum efficiency (η) are 57.44W and 13.5%, respectively, when the temperatures difference (ΔT) reaches 70 °C. This study presents a prototype of a versatile power generator (TEGs panel) offers free energy which can be utilising in insulation of building walls and power generation at the same time.

Keywords: Heat-gaining, thermal power, thermoelectric generators, TEGs panel, semiconductors, free Energy.

Biography: H.A Hussein is passionate about renewable energy to transform our world. Currently pursuing a Ph.D. in Mechanical Engineering at the University of Electronics and Technology of China, she is also an engineer at the Ministry of Construction and Housing in Baghdad, Iraq. With an academic background in Mechanical Engineering Hussein hope to make a significant impact in the renewable energy sector. Her passion for clean and sustainable energy solutions led her to focus her research and professional efforts on renewable energy technologies. Hussein has already made notable contributions to the field of renewable energy through her published articles and research endeavors. Her work primarily revolves around solar energy and the innovative ways to provide both thermal and electrical energy from this abundant resource. Her academic studies and practical experience have equipped her with the knowledge and skills needed to play an effective role in providing the world with the necessary clean and sustainable energy solutions.

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