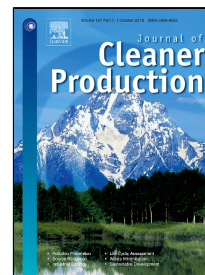


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Emin Açıkkalp, Mohammad H. Ahmadi

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Parametric Investigation of Phosphoric Acid Fuel Cell - Thermally Regenerative Electro Chemical Hybrid System

Emin Açikkalp^{a,*}, Mohammad H. Ahmadi^b

^a*Department of Mechanical Engineering, Engineering Faculty, Bilecik S.E. University, Bilecik, Turkey*

^b*Faculty of Mechanical Engineering, Shahrood University of Technology, Shahrood, Iran*

Abstract

In this paper, a phosphoric acid fuel cell (PAFC) – thermally regenerative electro-chemical cycle (TREC) hybrid system is investigated in terms of the different parameters including ecological function for different temperatures. Low temperature heat obtained by the PAFC is used by the TREC to generate electricity as a secondary power generator. Ecological function is applied to design an environmentally friendly hybrid system. Results are obtained numerically and an ecologically friendly operation range is attempted to determine for the considered system. According to results, the maximum power of the hybrid system is 885.60 W at 150 °C, 935.07 W at 180 °C, 949.07 W at 200 °C and the maximum ecological function is equal to 373.85 W at 150 °C, 431.63 W at 180 °C and 439.02 W at 200 °C and the maximum efficiency is 0.754 at 150 °C, 0.780 at 180 °C and 0.784 at 200 °C. Finally, it is recommended that current density should be chosen between current density at the maximum ecological function and current density at the maximum efficiency for a more efficient system.

Keywords: Phosphoric acid fuel cell, thermally regenerative electro-chemical cycle, ecological function

1. Introduction

Growing population of the world cause to explore new energy sources or using energy sources more efficiently. In addition, harmful environmental effects of the fossil fuels have gained attention. Fuel cell applications may be a solution to meet energy requirements and help humankind against to the

*Corresponding author.

E-mail addresses: acikkalp@gmail.com, emin.acikkalp@bilecik.edu.tr (E. Açikkalp).

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