عنوان مقاله:

Comprehensive performance evaluation and multi-criteria optimization of a novel tri-generation system based on geothermal energy

نویسندگان:

Nima Ghasemzadeh - Department of Mechanical Engineering, Faculty of Mechanical Engineering, University of Tabriz, Tabriz, Iran

Ramin Ghiami Sardroud - Faculty of Mechanical Engineering, Sahand University of Technology, Sahand New Town, Tabriz, Iran

Ehsan Gholamian - Department of Mechanical Engineering, Faculty of Mechanical Engineering, University of Tabriz, Tabriz, Iran

Mortaza Yari - Department of Mechanical Engineering, Faculty of Mechanical Engineering, University of Tabriz, Tabriz, Iran

خلاصه مقاله:

The novel tri-generation system powered by geothermal energy is assessed from exergo-economic and thermodynamic perspectives. The proposed system consists of a geothermal single flash cycle, an ORC with the OFOH and the IHE, a HDH desalination system, and a double-effect absorption refrigeration system. This system aims to produce power, cooling load, and the freshwater. The design parameters effects such as geothermal inlet temperature, the flash chamber inlet pressure, HPG temperature difference, and steam-turbine outlet pressure on the main indicators, including exergy efficiency, cooling load, total product unit cost, and produced freshwater mass flow rate. Moreover, the multi-objective optimization is applied using machine learning method and Grey wolf algorithm to optimize the total product unit cost, the net generated power rate, and the exergy efficiency. Under base design conditions, the total product unit cost and the exergy efficiency are ۷۷.۸ /GJ and ۴۴.۲%, respectively. Moreover, the results for the exergy efficiency, the total product unit cost, and the net generated power rate of the system under multi-objective optimization are ۵۴%, ۶۲.۵ /GJ, and ۱۸۰ kW. Among all elements of the current system, TEG۱ has the greatest rate of the exergy destruction, which is ۹۴.۰۲ kW. Additionally, the rate of the overall system exergy destruction is ۲۲۱.۷۲ kW

کلمات کلیدی:

Tri-generation, Geothermal, Thermo-economic, Multi-objective optimization, Machine Learning

لینک ثابت مقاله در پایگاه سیویلیکا:

https://civilica.com/doc/1965637