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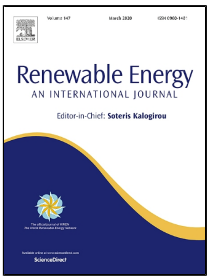

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A new trigeneration system for power, cooling, and freshwater production driven by a flash-binary geothermal heat source

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Abstract

Among different types of geothermal processing used in the energy conversion systems, flash-binary geothermal can be the best scenario for high-temperature geothermal sources. Reviewing the available literature it can be found that the flash-binary geothermal power plants have a great potential to be extended to trigeneration systems, nonetheless they have received less attention. In this regard, a new trigeneration system for freshwater, power, and cooling production is devised using a flash-binary geothermal heat source at 170℃. In this devised trigeneration system, a humidification-dehumidification (HDH) unit is used as a binary cycle. Another merit of the devised trigeneration system is provision of two different cooling temperatures for sub- and above-zero applications via using two ejector refrigeration cycles (ERCs). The feasibility of the reckoned trigeneration system is investigated from 1st and 2nd laws of thermodynamics viewpoint. Later, genetic algorithm (GA) method is used to optimize performance of the devised system by defining different optimum modes. It is found that optimization leads to the increment of the steam turbine output power, overall cooling load, trigeneration-based gain-output-ratio (TGOR) and exergy efficiency of around 77.08%,

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