Accepted Manuscript

Developing a novel methodology based on the adaptive neuro-fuzzy interference system for the exergoeconomic optimization of energy systems

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PII: \$0360-5442(18)31738-9

DOI: 10.1016/j.energy.2018.08.202

Reference: EGY 13678

To appear in: Energy

Received Date: 17 April 2018

Revised Date: 25 August 2018

Accepted Date: 27 August 2018

Please cite this article as: Sayyaadi H, Baghsheikhi M, Developing a novel methodology based on the adaptive neuro-fuzzy interference system for the exergoeconomic optimization of energy systems, *Energy* (2018), doi: 10.1016/j.energy.2018.08.202.

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2	interference system for the exergoeconomic optimization of energy systems
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11	
12	Abstract
13	Optimal control and design of energy systems in some instances require the fast exergoeconomic optimization.
14	Fuzzy inference systems (FIS) were previously employed for either the computerized iterative exergoeconomic
15	optimization or fast optimization of the energy system. The shortcoming of the FIS system was that the requirement
16	to have numerous fuzzy rules and fuzzy membership function that must be collected based on experts' knowledge
17	and usually with try and error steps. On the other hand, conventional optimization methods such as genetic
18	algorithm consume significant calculation time that makes them unsuitable for the fast optimization. In this paper,
19	the adaptive neuro-fuzzy interference system known as the ANFIS was introduced for fast exergoeconomic
20	optimization of energy systems. The ANFIS system automatically developed the required fuzzy items and used them
21	for fast optimization of energy systems. It was employed on two case studies, one for exergoeconomic design and
22	optimization of a benchmark energy system known as the CGAM problem. It was shown that the ANFIS could
23	achieve the optimal solutions of systems with reasonable accuracy, very low computation time, and without
24	dependency on experts' knowledge to develop fuzzy data. The ANFIS was found as an optimistic alternative for the
25	fast optimization of energy systems.
26	
27	Keywords: adaptive neuro-fuzzy interference system; CGAM problem; fuzzy inference system; iterative
28	exergoeconomic optimization; fast optimization; soft computing optimization tools

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