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HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Jurnal Ilmiah (Artikel)	:	Green Building Assessment Based on Energy Efficiency and Conservation (EEC) Category at Pascasarjana B Building Diponegoro University, Semarang		
Jumlah Penulis	:	3 orang ('Rahayu Indah Komalasari, P. Purwanto, **S. Suharyanto**.)		
Status Pengusul	:	penulis ke - 3		
Identitas Jurnal Ilmiah	:	a. Nama Jurnal	:	American Journal of Energy Research
		b. Nomor ISSN	:	ISSN (Print): 2328-7349, ISSN (Online): 2328-7330
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		d. Penerbit	:	Science and Education Publishing Co. Ltd
		e. DOI artikel (jika ada)	:	doi: 10.12691/ajer-2-2-4
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Semarang, 14 April 2020
Reviewer 2

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Green building assessment based on energy efficiency and conservation (EEC) category at pascasarjana B building diponegoro University-Semarang

RI Komalasari, P Purwanto… - American Journal of …, 2014 - pdfs.semanticscholar.org

Green building is a concept in which development should be implemented with environmental principles, start from design, construction, operation, and management. There is a Green Building Council Indonesia (GBCI) as a certification body for Green Building that established a Greenship New Building (NB) Version 1.2 as rating tools for green building assessment for new buildings in 2013. One of the categories that assessed is Energy Efficiency and Conservation (EEC). This study was conducted to determine how EEC criteria …

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Numerical Simulation of Natural Convection in a Vertical Conical Cylinder Partially Annular Space

by Belkacem OULD SAID, Noureddine RETIEL and El Hadi BOUGUERRA

American Journal of Energy Research. **2014**, 2(2), 24-29. DOI: 10.12691/ajer-2-2-1
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A Thermal Analysis and Optimization of a Combined Cycle by Several Technologies

by KILANI Nihed, KHIR Tahar and BEN BRAHIM Ammar

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Green Building Assessment Based on Energy Efficiency and Conservation (EEC) Category at Pascasarjana B Building Diponegoro University, Semarang

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A Thermal Analysis and Optimization of a Combined Cycle by Several Technologies

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Abstract Thermodynamic optimization of four power plant installations with different technology is presented and discussed in this paper. Numerical optimization of the different cycles is performed in aim to obtain higher efficiency. Thermal analysis performance for the fourth cycles is performed for a define range of operating parameters using a calculation code established according to EES software. The first studied cycle is a simple combined cycle containing gas turbine cycle with a steam injection system, one pressure heat recovery steam generator HRSG and a steam turbine cycle. The overall efficiency of this cycle in inlet ambient conditions is about 46%. The second cycle is a combined one with steam injection system for which the steam injected is generated outside the HRSG using heat recovery system at the air compressor outlet. The performance of this cycle in the same initial conditions is higher of about 1%. The third plant is a combined cycle with steam injection and two steam extractions from steam turbine and two open feedwater heaters. The performance of this cycle is higher of about 1% compared to the first one. The last considered power plant technology is a combined cycle with heat recovery at air compressor outlet and steam extraction. Obtained results show that the optimum operating parameters leading to the best performances are not the same for different cycles.

Keywords: *combined cycle, steam extraction, heat recovery, optimization, thermal efficiency*

Cite This Article: KILANI Nihed, KHIR Tahar, and BEN BRAHIM Ammar, "A Thermal Analysis and Optimization of a Combined Cycle by Several Technologies." *American Journal of Energy Research*, vol. 2, no. 2 (2014): 35-41. doi: 10.12691/ajer-2-2-3.

1. Introduction

Due to excessive demand for electricity new technologies are used for power plant cycle in aim to improve its performances. One of the major used resources is the fossil fuels.

Electricity production from fossil fuels has been known since 1936. Simple steam turbine cycles are firstly used with low thermal efficiency. Then the simple cycle is improved and combined with the gas turbine plant. Gas turbine cycle is very popular due to its relatively low capital cost, its significant reliability and flexibility, Basrawi et Al [1]. In the other hand considering evolutionary need for electricity many optimization and new power plants are carried out driving an evolution of the efficiency and produced net power. In addition the requirements of safety, environmental conditions and the excess of fuels price made the combined cycle more required because of its advantages in front of the other cycles Silveira et al. [2].

Several optimization studies, and research works were carried out [3,4]. Nord and Bolland [5] were developed new technologies to eliminate CO_2 and improve the thermal efficiency for the same fuel flow rate used in traditional cycles. Sayyaadi and Mehrabipour [6] are used heat recovery system with tubular heat exchanger to improve the gas turbine cycle efficiency. Ibrahim et al [7] obtained an efficiency of 64.5% for a combined cycle with regeneration. Carcasci and Facchini [8] performed a comparison between two power plant installations with multi pressure HRSG and obtained a thermal efficiency of 60%. Najjar et al [9] achieved a comparison between three processes for gas turbine blade cooling; the thermal efficiency of about 53 % is obtained.

To minimize the emission of polluted gas and increase the gas turbine mass flow rate Bouam et al [10] used a steam injection system. That permitted an increase of the gas turbine cycle efficiency of about 0.11% for each 1% of steam injected.

This study is focused on the comparison between four combined power plants having the following design characteristics:

1. Simple combined cycle with steam injection.
2. Combined cycle with steam injection and compressed air cooling.
3. Combined cycle with steam injection into combustion chamber and steam extraction from the steam turbine.
4. The fourth considered plant is a combination between the second and third cycles.

1.1. Simple combined cycle with steam injection

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Numerical Simulation of Natural Convection in a Vertical Conical Cylinder Partially Annular Space

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Abstract The present paper is dedicated to the numerical simulation of thermal convection in a two dimensional vertical conical cylinder partially annular space. The governing equations of mass, momentum and energy are solved using the CFD FLUENT code. The results of streamlines and the isotherms of the fluid are discussed for different annuli with various boundary conditions and Rayleigh numbers. Emphasis was put on the height of the inner vertical cylinder influence on the flow and the temperature distribution. More, the effects on the heat transfer are analyzed for different values of the fluid's physical parameters in the annulus geometry. The heat transfer on the hot wall of the annulus is also computed in order to make comparisons the cylinder annulus for boundary conditions and several Rayleigh numbers. The obtained results in terms of Nusselt number has been found between the present previsions and available data from the published literature data.

Keywords: *natural convection, heat transfer, numerical simulation, conical cylinder, partially annular, CFD fluent*

Cite This Article: Belkacem OULD SAID, Noureddine RETIEL, and El Hadi BOUGUERRA, "Numerical Simulation of Natural Convection in a Vertical Conical Cylinder Partially Annular Space." *American Journal of Energy Research*, vol. 2, no. 2 (2014): 24-29. doi: 10.12691/ajer-2-2-1.

1. Introduction

The natural convection in an enclosure is a large research topic due to its wide variety of engineering applications involving energy conversion, storage and transmission systems. Annular space cavities are used in solar collectors [1] and the nuclear reactor design. A comprehensive review of natural convection in various cavity shapes has been documented in the literature. Among the very first investigations, Wang [2] has analyzed numerically the heat transfer problem by natural convection in a rectangular enclosure filled by micropolar fluid, and particularity studied the influence of the conductive vertical divider. The case of square and cubic cavities was reported by [3,4]. Other investigations [5] have been conducted used CFD simulations to study the effect of the physical and geometrical parameters in two-dimensional vertical enclosure. The complex shapes such that inclined cavities with wavy walls by Aounallah [6], and trapezoidal cavities by Varol [7]. Natural convection and fluid flow was studied for triangular enclosures mostly with boundary conditions, see [8,9]. Varol [10] have carried investigations of heat transfer by protruding isothermal heater within a triangular enclosure. The numerical study of the phenomenon of natural convection flow in a vertical concentric annular with isothermal inner and outer vertical walls have been conducted by various authors [11,12,17,18]. Several problems that have been extensively studied due to their several practical applications have received much attention. Hammad [13] analyzed the effect of tilted angle and diameter ratio on natural convection heat transfer in the case of horizontal cylindrical annulus. Investigations on the transition effect and turbulence flows on natural convection along a horizontal annular cavity with local and mean Nusselt numbers were presented by [14] and recently by [15]. Few researches has been done to conical shape, we include a numerical study on heat transfer by natural convection and radiation in conical annular porous cylinder and presented by Salman, N.J.A. & al. [16]. These studies were restricted to conduction heat transfer only. The present paper covers the laminar natural convection in a vertical conical cylinder partially annular space. On the other hand, the direct numerical simulation (DNS) approach necessary for a good resolution of the heat transfer problems requires computational resources beyond actual computing capacities dedicated for real industrial problems. We will be concerned also with the effect of the Rayleigh number, radius ratio and height ratio of annulus as well as the cavity geometry on the heat transfer.

2. Mathematical formulation

2.1. Physical Domain