

**LEMBAR HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW KARYA ILMIAH
: PROSIDING KONFERENSI INTERNASIONAL BEREPUTASI**

Judul Jurnal Ilmiah (Artikel) : Optimization of maximum lift to drag ratio on airfoil design based on artificial neural network utilizing genetic algorithm

Jumlah Penulis : Ismoyo Haryanto, MSK Tony Suryo Utomo, **Nazaruddin Sinaga***, Citra Asti Rosalia, dan Aditya Pratama Putra

Status Pengusul : Penulis ke-3

Identitas Jurnal Ilmiah : a. Nama Jurnal : Applied Mechanics and Materials
b. Nomor ISSN : 1662-7482
c. Volume, nomor, bulan tahun : 493, Januari 2014
d. Penerbit : Trans Tech Publications, Switzerland
e. DOI artikel (jika ada) : 10.4028/www.scientific.net/AMM.493.123
f. Alamat web jurnal :
https://www.scientific.net/AMM.493/3
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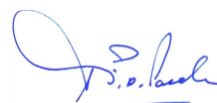
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Bidang Ilmu: Teknik Mesin
Fakultas Teknik Mesin dan Dirgantara
Institut Teknologi Bandung

**LEMBAR HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
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Applied Mechanics and Materials

Volume 493, 2014, Pages 123-128

International Conference on Mechanical Engineering, ICOME 2013; Mataram, Lombok; Indonesia; 19 September 2013 through 21 September 2013; Code 102254

Optimization of maximum lift to drag ratio on airfoil design based on Artificial Neural Network utilizing Genetic Algorithm (Conference Paper)

Haryanto, I., Utomo, T.S., Sinaga, N., Rosalia, C.A., Putra, A.P. [View additional authors](#) [Save all to author list](#)



Department of Mechanical Engineering, Diponegoro University, Kampus Tembalang, Semarang 50275, Indonesia

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Abstract

This paper deals with an alternative design method of airfoil for wind turbine blade for low wind speed based on combination of smart computing and numerical optimization. In this work, a simulation of Artificial Neural Network (ANN) for determining the relation between airfoil geometry and its aerodynamic characteristics was conducted. First, several airfoil geometries were generated through transformation of complex variables (Joukowski transformation), and then lift and drag coefficients of each airfoil were determined using CFD (Computational Fluid Dynamics). In present study, the ANN training was conducted using airfoil geometry and its aerodynamic characteristics as input and output, respectively. Therefore, lift and drag coefficients can be directly determined only by giving the airfoil geometry without having to perform wind tunnel experiment or numerical computation. Moreover, the optimization was conducted to obtain an airfoil geometry which gives maximum lift to drag ratio (C_L/C_D) for specific Reynolds number. For this purpose Genetic Algorithm (GA) was applied as optimizer. The results were validated using commercial CFD and it can be shown that the result are satisfactory with error approximately of 6%. © (2014) Trans Tech Publications, Switzerland.

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Experimental and computational study on heat transfer of a 150 kW air-cooled eddy current dynamometer

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Chen, H. , Deng, K. , Li, R.

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ISSN: 16609336
ISBN: 978-303785990-2
Source Type: Book series
Original language: English

DOI: 10.4028/www.scientific.net/AMM.493.123
Document Type: Conference Paper
Sponsors: ITS,BKS-TM Indonesia,CET PT. Graha Elektro Tama,Lintech,Dinamika Energitama Nusantara,et al

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1	2	3	4	5	...	>	>>
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Paper Title

Page

Editorial Note

Design of a Bubbling Fluidized Bed Gasifier for the Thermochemical Conversion of Oil Palm Empty Fruit Bunch Briquette 3

Authors: Anwar Johari, B.B. Nyakuma, A. Ahmad, T.A. Tuan Abdullah, M.J. Kamaruddin, R. Mat, A. Ali

Abstract: This paper is focused on the design of a bubbling fluidized bed gasifier (BFBG) for EFB briquette gasification. The annual production of [...more](#)

Design of a Bubbling Fluidized Bed Gasifier for the thermochemical conversion of Oil Palm Empty Fruit Bunch Briquette

A. Johari¹, B. B. Nyakuma¹, A. Ahmad¹, T. A. Tuan Abdullah¹,
M. J. Kamaruddin¹, R. Mat¹, A. Ali²

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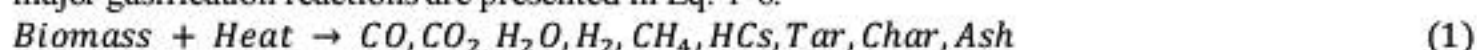
Keywords: Bubbling Fluidized Bed Reactor, Gasification, Combustion, Oil Palm, Empty Fruit Bunch, Briquette.

Abstract. This paper is focused on the design of a bubbling fluidized bed gasifier (BFBG) for EFB briquette gasification. The annual production of palm oil in Malaysia generates large quantities of lignocellulosic biomass which can be converted into clean, sustainable energy for the future. Hence, the prospect of valorising palm waste using biomass gasifiers presents a viable option for energy production. The fluidized bed gasifier (FBG) is considered the most suitable reactor for biomass gasification due excellent mixing, efficient heat temperature control and tolerance for fuels. Consequently, the proposed design of the bubbling fluidized bed gasifier for EFB briquette gasification will consist of three main parts; feeding zone, gasification zone and the effluent gas zone for syngas production. The results of feedstock physicochemical properties such as bulk density, particle size, the bed hydrodynamic and fluidization parameters for gasification used in the design of the gasifier are presented in this paper.

Introduction

The transition from fossil fuels to renewable sources of energy remains a key challenge for many emerging economies. In Malaysia the large quantities of lignocellulosic waste resulting from crude palm oil production provides a good source of fuel for biomass conversion technologies.

Biomass conversion can be carried out either by thermochemical or biochemical methods. Gasification has gained widespread acceptance as an efficient thermochemical biomass conversion method due to its potential environmental benefits, low set up costs and relative simplicity. Gasification involves converting low value fuels into gaseous products at high temperatures using air, steam or oxygen as gasifying medium in specially designed equipment called gasifiers [1, 2]. The major gasification reactions are presented in Eq. 1-6.



In practice the exothermic reactions between the fuel and air/O₂ in the gasifier supply the thermal energy for gasification.

There are three types of gasifiers; fixed or moving bed, fluidized bed and entrained flow [1, 2]. The fluidized bed gasifier (FBG) is considered the most suitable gasifier for biomass gasification due to its tolerance for different types of fuel, excellent mixing, and temperature control. In addition, the operating FBGs require moderate air, oxygen and steam input, resulting in high cold gas efficiency, and carbon conversion [2, 3, 4]. Two types of FBG gasifiers exist; bubbling fluidized bed gasifier (BFBG) and circulating fluidized bed gasifier (CFBG).

- Laminar Flow Past a Circular Cylinder: Reduction of Drag and Fluctuating Lift Using Upstream and Downstream Rods** 9
Authors: Dedy Zulhidayat Noor, Eddy Widiyono, Suhariyanto, Lisa Rusdiyana, Joko Sarsetiyanto
Abstract: Laminar flow past a circular cylinder has been studied numerically at low Reynolds number. The upstream and downstream ...more
-
- Trans-Esterification of Triglycerides with Methanol on Sulfated Zirconia Prepared with Different Concentration of Sulfuric Acid** 15
Authors: Ramli Mat, Rubyatul Adawiyah Samsudin, Mahadhir Mohamed, Anwar Johari, Mohd Johari Kamaruddin, Asmadi Ali
-
- Numerical Studies on R22 Refrigerant Compressor Using Environment Friendly Working Fluids** 21
Authors: K.G. Sai Shreenaath, Jigar Golecha, L. Bruno Augustin, M. Suresh
Abstract: Vapour compression refrigeration is the most widely used method in domestic and commercial air conditioning and refrigeration ...more
-
- Case Studies Thermal Analysis of HP Condensate Stabilizer Column** 27
Authors: Muhammad Qirom, Antonius Indarto, I. Arsa Putrawan
Abstract: The HP condensate stabilizer column is located in the condensate stabilizer unit that functions to recover light hydrocarbons ...more
-
- The Influence of Hydrogen Addition to Diesel Fuel Spray Combustion for Different Atomization Conditions** 33
Authors: Nyenyep Sriwardani, Yuya Okamoto, Takehiko Seo, Masato Mikami
Abstract: The negative effects of hydrocarbon fuels are widely highlighted by increasing global warming and declining quality of ...more
-
- Hydrogen Production from Acetic Acid Steam Reforming over Bimetallic Ni-Co on La₂O₃ Catalyst-Effect of the Catalyst Dilution** 39
Authors: Tuan Amran Tuan Abdullah, Walid Nabgan, Mohd Johari Kamaruddin, Ramli Mat, Anwar Johari, Arshad Ahmad
Abstract: Catalytic steam reforming of acetic acid using bimetallic catalysts of 5 wt.% nickel and 5 wt.% cobalt supported on Lanthanum

Numerical Studies on R22 Refrigerant Compressor Using Environment Friendly Working Fluids

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Keywords: vapour compression refrigeration; compressor; alternate refrigerants; numerical simulation

Abstract

Vapour compression refrigeration is the most widely used method in domestic and commercial air conditioning and refrigeration systems. R22 (difluoromonochloromethane) is the most widely used HCFC (hydro chlorofluorocarbon) refrigerant in residential, commercial, industrial and transport cooling systems. Montreal protocol in 1987 banned the use of CFCs (chlorofluorocarbon) due to their adverse impact on the environment causing ozone depletion and global warming. HCFCs are also being phased out, though they are less destructive than CFCs. The present work explores compressor performance using alternate environment friendly working fluids so that R22 can be replaced in future. The refrigerants used for the studies are R134a (tetrafluoroethane), R290 (propane) and R600a (isobutane). Compressor performance is analysed by varying refrigerant mass flow rate, evaporator and condenser temperatures and studying their effect on compressor size, power and discharge temperature. A numerical simulation code has been developed in MATLAB using refrigerant properties taken from REFPROP.

Introduction

Vapour compression is the most widely used system for producing refrigeration. Initially pure hydrocarbons were used as working fluids. Later they were replaced by CFCs and HCFCs. They were considered as ideal refrigerants until it was found that they caused adverse impact on the environment causing ozone depletion and global warming. Montreal protocol in 1987 phased out CFCs and HCFCs are being phased out. R22 is the most widely used HCFC refrigerant in residential, commercial, industrial and transport cooling systems. R22 has to be replaced in future, by a suitable refrigerant or refrigerant mixture.

C Aprea(2003) [1] in his paper compared R407C and R22 in a vapour compression plant. The investigation has revealed that R22 performs better than R407C mainly because of a better compression process due to a number of factors, including the facts that the isentropic and volumetric efficiencies of the semi-hermetic compressor are better than that of R407C. Y.S.Lee (2002) [2] performed an experimental study on the performance of a domestic vapour-compression refrigeration system with isobutane (R600a) as the refrigerant. Neil A Roberts, Owen R Chambers (2004) [3] presented the results of laboratory and practical studies of three HFC blends based on R125, R134a and R600 or R600a which have been shown to demonstrate superior energy efficiency and in one case 23% lower global warming potential than the above mentioned HFC alternatives. James M. Calm and Dr Piotr (2004)[4] talked about the phase out of R22 and its various alternatives available for R22.

The Influence of Hydrogen Addition to Diesel Fuel Spray Combustion For Different Atomization Conditions

Nyenyep Sriwardani^{1,a}, Yuya Okamoto^{1,b}, Takehiko Seo^{2,c}, Masato Mikami^{2,d}

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Keywords: Spray combustion, additional hydrogen, atomization, emission index

Abstract. The negative effects of hydrocarbon fuels are widely highlighted by increasing global warming and declining quality of human health. Therefore, it is important to reduce the level of emissions from liquid hydrocarbon combustion. Hydrogen addition to the combustion chamber is one of the proven methods to improve emissions level. In this research, an experiment was conducted on diesel fuel spray combustion with hydrogen addition. The effect of additional hydrogen was observed on CO, CO₂, NO and THC exhaust gas emissions. A small hydrogen fraction (0~3 vol %) was added to the rich premixed spray combustion. The results show that increasing the hydrogen fraction reduced the emission indexes of CO and THC, and increased the emission index of CO₂. Increasing the hydrogen fraction caused an increase in the emission index of NO, but the actual physical amount was insignificant. Increasing the atomizing air flow rate reduced the CO and THC emission indexes, but increased the CO₂ and NO emission indexes.

Introduction

Diesel fuel is widely used in land vehicles due to its many advantages. One of the merits of a diesel engine is higher thermal efficiency than gasoline engines [1]. Diesel fuel is used not only in engines but also industrial furnaces, in which diesel fuel spray continuously burns. However, diesel fuel has some drawbacks. One of the disadvantages is particulate matter (PM) emission via the exhaust gas. This drawback can be improved by incorporating hydrogen into diesel fuel combustion which can lead to improved fuel consumption and low PM emission level due to no carbon content [1,2]. Another positive effect of hydrogen as a fuel are no sulfur and a promising solution for ultra-lean premixed combustion. Moreover, hydrogen has a large energy per unit mass, which is 2.5 times as high as that of diesel fuel. Therefore, combustion can occur in lower overall equivalence ratio, which results in lower temperatures in the combustion zone [3]. In recent years, researchers have conducted a substantial number of studies on hydrogen-based combustion related to the green technology field [3-5]. Several researchers have applied hydrogen as a fuel to the engine. The acquired results show that a hydrogen fueled engine has a higher heat transfer rate than a methane fuel engine. This is because hydrogen fuel has higher heating value, faster flame speed and a smaller quenching distance [6]. Another obvious advantage of hydrogen is its renewability since it can be generated from water [7].

Juste [8] studied injection of small quantities hydrogen in a hydrocarbon-fuelled burner. Hydrogen was injected in the primary zone, where the fuel is premixed with air. The results showed that there was possible positive effects of additional hydrogen to hydrocarbon combustion. The present study supplied hydrogen near to the flame base without premixing with air. We investigated the effect of additional hydrogen to the diesel fuel spray combustion for different atomization conditions.

[...more](#)

Driving Efficiency through Hydrocarbon for Green Car Air Conditioning

45

Authors: Afiq Aiman Dahlan, Henry Nasution, Azhar Abdul Aziz, Zulkarnain Abdul Latiff, Mohd Rozi Mohd Perang, A.Y. Wan Mohd

Abstract: The feasibility of hydrocarbon mixtures to replace HFC-R134a in automotive air conditioning systems is investigated in this paper. The

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Air to Air Ejector with Various Divergent Mixing Chambers

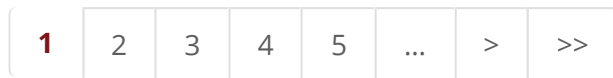
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Authors: Václav Dvořák

Abstract: The article deals with experimental investigation of subsonic air to air ejector with various configurations of the mixing chamber and

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Air to air ejector with various divergent mixing chambers

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Keywords: Air ejector, diffuser, mixing chamber.

Abstract. The article deals with experimental investigation of subsonic air to air ejector with various configurations of the mixing chamber and the diffuser. A constant mixing chamber, 2° and 4° divergent mixing chambers and 6° diffuser were applied to find differences in the mixing process. Characteristics of the ejector, static pressure distributions and pressure fluctuations were measured to find how the different shape of the mixing chamber affect the efficiency of mixing processes. Pressure fluctuation increased rapidly while the ejection ratio was higher than 1.25 and the highest efficiency of the ejector was obtained when using configuration "4-4-6".

Introduction

Ejectors are used for many purposes, but the process is basically the same in every case: a high-pressure fluid (the primary stream) transfers part of its energy to a low pressure fluid (the secondary stream) and the resulting mixture is discharged at a pressure that lie between the driving pressure and the suction pressure. By the time that Keenan et al [1] performed the first comprehensive study of mixing, two cases of mixing were distinguished: the constant pressure mixing and the constant area mixing. However, nobody has yet established a definite link between the performance of constant area and constant pressure ejectors, as stated Sun and Eames [2]. Tylor and Williamson [3] divided the mixing into two regions. In the initial region of mixing, the shear layer between the primary and the secondary stream does not reach the mixing chamber wall. In the main region of mixing, the shear layer spreads across the whole mixing chamber cross section. The momentum decay is slow in the initial region and static pressure changes only slightly. We can consider a free stream here. But the momentum decay and also static pressure rise are accelerated in the main region.

Many studies deal with optimization of some separated parameters of ejector or with intensification of the mixing process, as they are in a review carried out by Porter and Squyers [4]. Also nowadays many researchers investigate influences of separated design parameters. For example, Aphornratana and Eames [5] performed experiments on ejector with a moveable primary nozzle. An optimization of a suction chamber was done by Yadav and Patwardhan in work [6]. They designed the diameter of the suction chamber, the position of the primary nozzle and the angle of the necking of the suction chamber, but no optimization method was used. Watanawanavet optimized a supersonic ejector in his thesis [7]. Again, separated parameters were optimized, no optimization method was used and the optimization missed complexity. Cizungu et al. [8] used a one-dimensional model of compressible flow to optimize an ejector for a cooling system. The results of this work were a determination of a suitable area ratio, the length of the mixing chamber and of the diffuser and several operation parameters. Dvorak [9] optimized ejector in a complex way using Fluent software. Thus the resulting shape of the ejector was not limited by a choice of initial optimization parameters. As a result, a constant pressure mixing chamber for initial region and divergent mixing chamber for main region of mixing were obtained. Experimental investigation of constant area mixing made by Dvorak et al [10] showed that for high ejection ratio a slow nonperiodical oscillation of the whole flow field occurred. It seems that these oscillations appear when the mixing is not finished before the diffuser. As was shown by Dvorak and Dancova in [11] the flow can be stabilised by applying additional oscillations made by synthetic jets. The aim of this work is to investigate mixing in axi-symmetric subsonic ejector with various configurations of the mixing chamber and the diffuser. A constant area mixing chamber, 2° and 4° divergent mixing chambers and 6° diffuser were applied to find differences in the mixing process, obtained ejector efficiency and pressure fluctuations.

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Papers

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Search

< 1 2 **3** 4 5 ... > >>

Paper Title

Page

Redesign ITS Central Library through Smart Building

117

Authors: Muhammad Junaidi, Kusriantoko Parindra, Hosta Ardhyananta, Ary Bachtiar, Anton A. Dimas

Abstract: Energy conservation is one of many technique applied to reduce the global warming effect. Sepuluh Nopember Institute of

[...more](#)

Optimization of Maximum Lift to Drag Ratio on Airfoil Design

123

Based on Artificial Neural Network Utilizing Genetic

Algorithm

Authors: Ismoyo Haryanto, Tony Suryo Utomo, Nazaruddin Sinaga, Citra Asti Rosalia, Aditya Pratama Putra

Abstract: . This paper deals with an alternative design method of airfoil for wind turbine blade for low wind speed based on combination of [...more](#)

Carbon Dioxide Effects on the Flammability Characteristics of Biogas 129

Authors: Nurkholis Hamidi

Abstract: Flammability limits and flame speed of methane-carbon dioxide-air mixtures have been studied to understand the effect of [...more](#)

Heat Transfer Effectiveness and Coefficient of Pressure Drop on the Shell Side of a Staggered Elliptical Tubes Bank 134

Authors: Utomo Kukuh W. Budi, Kamal Samsul, Suhanan, I. Made Suardjaja

Abstract: The effectiveness of heat transfer and the pressure drop coefficient of staggered elliptical tube banks are studied experimentally. [...more](#)

Experimental Study on the Effect of Reynolds Number Variation on Drag Force for Various Cut Angle on D-Type Cylinders 140

Authors: Astu Pudjanarsa, Ardian Ardawalika

Abstract: Experimental study on the effect of Reynolds number variation on drag force for various cut angles on D-type cylinders was [...more](#)

Performance of Conical Diffuser on Liquid Jet Gas Ejector 145

Authors: Daru Sugati, Indarto, Purnomo, Sutrisno

Abstract: Liquid gas ejector uses liquid as the motive fluid and gas as the entrained fluid. The presence of gas in the liquid reduces the [...more](#)

An Investigation into the Effect of Drag Coefficient on Overtaking of Car 151

Authors: S.S. Al Homoud, Dani Harmanto, Ilias Oraifige

Abstract: The purpose of this report is the effect of the drag coefficient on the car when it is travelling on the road and at different positions [...more](#)

Effects of Pine Oil on Dynamics of Bubble in Froth Flotation 155

Authors: Warjito, Indra Pranata Al Kautsar

Abstract: Dynamics of bubble in froth flotation have been studied. The purpose of this research is to study the effects of pine oil on the

[...more](#)

Study on Auto-Ignition Behavior of Lubricating Oil in a Cone Calorimeter

161

Authors: Muhammad Andira Mulia Siregar, Yulianto Sulisty Nugroho

Abstract: Auto-ignition behavior of lubricating oil is studied experimentally using a cone calorimeter. Based on its Material Safety

[...more](#)

Solar Driven Absorption Chiller for Medium Temperature Food Refrigeration, a Study for Application in Indonesia

167

Authors: I Nyoman Suamir

Abstract: Indonesia has abundant renewable energy resources. In 2005 this country, however, only consumed 0.38% renewable energy of the

[...more](#)

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-
- - [Home](#)
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 - [Committee](#)
 - [Registration](#)
 - [Important Dates](#)
 - [Schedule](#)
 - [Venue](#)
 - [Topic](#)
 - [Paper Submission](#)
 - [Tour](#)
 - [Contact](#)
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Home

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Schedule

Venue

Topic

Paper Submission

Tour

Contact

Registration Form

Information

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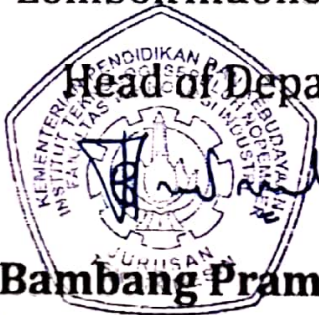
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