LEMBAR

HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*

KARYA ILMIAH : JURNAL ILMIAH

Judul Artikel Ilmiah : Turbulent Flow Analysis in Auxiliary Cross-Flow Runner of a Proto X-3 Bioenergy Micro Gas Turbine using RNG k-ε Turbulence Model

Nama Penulis : Steven D., Ahmad I. S., Budiarso, Asyari D., AgusT. G., Achmad B. W. and **HartoTanujaya**

Jumlah Penulis : 7 (tujuh)

Status Pengusul : Penulis Pendamping

Identitas Buku Ilmiah :
- a. Nama Jurnal : ARPN Journal of Engineering and Applied Sciences
- b. Nomor ISSN : 1819 - 6608
- c. Vol. No. Bln. Th. : Volume 10, Issue 16, 2015
- d. Penerbit: Asian Research Publishing Network (ARPN)
- e. Jumlah halaman : 6 halaman
- f. Alamat Web Jurnal: http://www.arpnjournals.com/jeas/research_papers/rp_2015/jeas_0915_2522.pdf

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(beri (√) pada kategori yang tepat)

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- [ ] Jurnal Ilmiah Internasional
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|---|---|

Jakarta, 18.12. 2019

Penilai I

(Prof. Dr. Ir. Agustinus Purna Irawan)

NIDN/NIP : 0328087102 / 10398021

Jabatan/Pangkat/Bidang Ilmu: Professor/IVC/Teknik Mesin

Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

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Jakarta, 18.12. 2019
Penilai I

(Prof. Dr. Ir. Agustinus Purna Irawan)
NIDN/NIP : 0328087102 / 10398021
Jabatan/Pangkat/Bidang Ilmu: Professor/IVC/Teknik Mesin
Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

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| Kelengkapan dan kesesuaian unsur isi *prosiding* (10%) | 4 | | | | | 3,72 |
| Ruang lingkup dan kedalaman pembahasan (30%) | 12 | | | | | 11,28 |
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| Total = 100% | 40 | | | | | 38,04 |
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Jakarta, 12-11- 2019

Penilai

(Dr. Ir. M. Sobron Yamin L., M.Sc.)

NIDN/NIP : 0114056705 / 10311009

Jabatan/Pangkat/Bidang Ilmu: Lektor Kepala/IV/Teknik Mesin

Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

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Jakarta, 14-11- 2019
Penilai II

(Dr. Ir. M. Sobron Yamin L., M.Sc.)
NIDN/NIP : 0114056705 / 10311009
Jabatan/Pangkat/Bidang Ilmu: Lektor Kepala/IV/Teknik Mesin
Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

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Engineering (miscellaneous)

**Publisher** Asian Research Publishing Network (ARPN)

**Publication type** Journals

**ISSN** 18196608

**Coverage** 2011-ongoing

**Scope** ARPN Journal of Engineering and Applied Sciences (ISSN 1819-6608) is an online peer-reviewed International research journal aiming at promoting and publishing original high quality research in all disciplines of engineering sciences and technology. All research articles submitted to ARPN-JEAS should be original in nature, never previously published in any journal or presented in a conference or undergoing such process across the globe. All the submissions will be peer-reviewed by the panel of experts associated with particular field. Submitted papers should meet the internationally accepted criteria and manuscripts should follow the style of the journal for the purpose of both reviewing and editing. Our mission is -In cooperation with our business partners, lower the world-wide cost of research publishing operations. -Provide an infrastructure that enriches the capacity for research facilitation and communication, among researchers, college and university teachers, students and other related stakeholders. -Reshape the means for dissemination and management of information and knowledge in ways that enhance opportunities for research and learning and improve access to scholarly resources. -Expand access to research publishing to the public. -Ensure high-quality, effective and efficient production and support good research and development activities that meet or exceed the expectations of research community. Scope of Journal of Engineering and Applied Sciences: -Engineering Mechanics -Construction Materials -Surveying -Fluid Mechanics & Hydraulics -Modeling & Simulations -Thermodynamics -Manufacturing Technologies -Refrigeration & Air-conditioning -Metallurgy -Automatic Control Systems -Electronic Communication Systems -Agricultural Machinery & Equipment -Mining & Minerals -Mechatronics -Applied Sciences -Public Health Engineering -Chemical Engineering -Hydrology -Tube Wells & Pumps -Structures

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**21**

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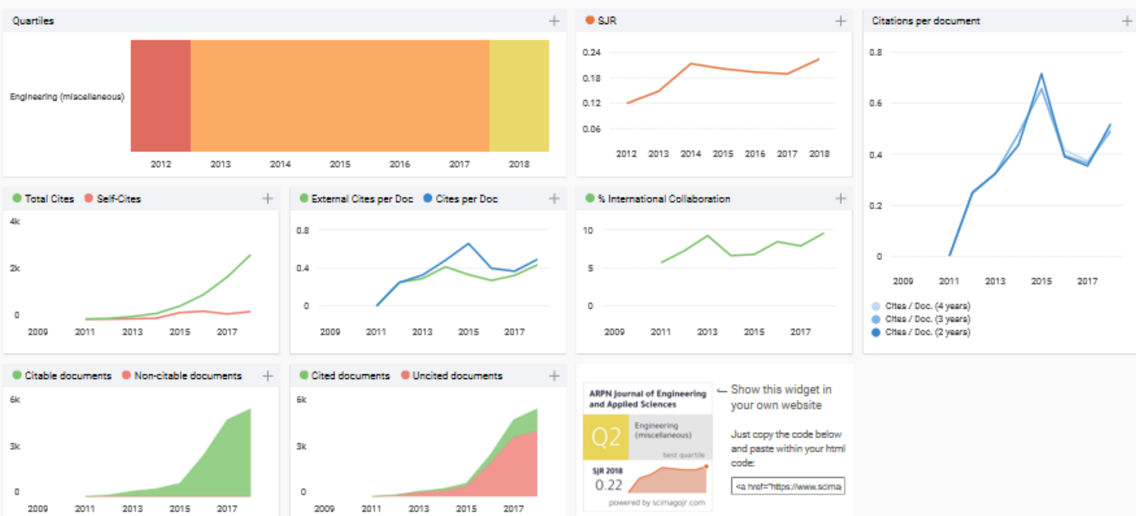

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# TURBULENT FLOW ANALYSIS IN AUXILIARY CROSS-FLOW RUNNER OF A PROTO X-3 BIOENERGY MICRO GAS TURBINE USING RNG $k$-$\varepsilon$ TURBULENCE MODEL

Steven Darmawan[1,2], Ahmad Indra Siswantara[1], Budiarso[1], Asyari Daryus[1,3], Agus Tri Gunawan[1], Achmad Bayu Wijayanto[1] and Harito Tanujaya[2]

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## ABSTRACT

[illegible] Bioenergy Micro Gas Turbine (MGT) that has been developed. The MGT is a dual-stage radial compressor-turbine type. Furthermore, highly turbulent flow inside the cross-flow fan need accurate analysis. CFD method with RNG $k$-$\varepsilon$ chosen based on models characteristics. This paper analyzed the flow inside the fan based on the experimental data of the MGT and the result represented by several parameters of turbulent flow. The simulation condition were assumed to be isothermal due to the small temperature difference with the turbulent Prandtl number $Pr_t = 1$. The result shows several specific vortex inside the runner. Recirculation flow that caused the eccentric vortex occurs at the inner side while the throughflow occurs at the outerside of the fan. The mass flow rate conducted by CFD simulation shows a good agreement with the actual mass flow rate of the cross-flow runner. The results that presented by velocity magnitude, absolute pressure, eddy dissipation, and turbulence kinetic energy shows a realistic on each turbulent parameter based on their trends. This results shows that the method used is prospective to be applied both on analysis or design of the cross-flow runner.

Keywords: cross-flow runner, MGT, turbulent flow, RNG $k$-$\varepsilon$ turbulence model, recirculation vortex.

## INTRODUCTION

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Page: 1 of 6 Word Count: 3544 Text-only Report High Resolution On