

ISBN :



CONFERENCE PROGRAMS AND ABSTRACT

**ADVANCING SUSTAINABLE SCIENCE AND TECHNOLOGY
THROUGH EFFECTIVE COLLABORATION**

OCTOBER 20-21, 2021

**Palembang, Province of South Sumatera
Indonesia**

Organized By :



FOREWORD FROM GENERAL CHAIR 5th FIRST 2021 INTERNATIONAL CONFERENCE



Assalamu'alaikum wr wb,

Alhamdulillahirrobbil 'alamin, Thank to the God, almighty, due to His bless and love, we are granted good health and opportunity so that we can meet here in the event of the 5th FIRST and the 3rd SNAPTEKMAS 2021.

The honorable keynote speakers of the 5th FIRST and the 3rd SNAPTEKMAS 2021

Dra. Nana Yuliana, MA., Ph.D., as The Indonesian LBBP Ambassador for the Republic of Cuba, concurrently with the Commonwealth of the Bahamas, Jamaica, the Dominican Republic and Haiti

Prof. Ramaraj Boopathy. from U Alcee Fortier Distinguished Service Professor of Biological Sciences At the Nicholls State University, USA

Dr. Ing. Ahmad Taqwa, the Director of State Polytechnic of Sriwijaya.

The honourable keynote speakers, distinguished guests, all participants, ladies and gentlemen,

For the beginning of my speech, let me welcome all of you with my great warm hug. It is a great honor for me that you choose the 5th FIRST and the 3rd SNAPTEKMAS 2021 as your conference. I am so proud that the authors still become enthusiastic to develop the knowledge although in this pandemic situation. Let us still work hard to support the development of the world through the research, science, and technology in many parts of the knowledge, as what has been purposed by the FIRST conference itself.

In this occasion, I would like proudly to inform you that the 5th FIRST and the 3rd SNAPTEKMAS 2021 as the forum to share knowledge, to search, to find, and to enlarge the link with other industries and universities has attracted so many authors from abroad, such as from: Politeknik Tun Syed Nasir Syed Ismail; MARA University; Politeknik Mukah Sarawak; University Sultan Zainal Abidin, Terengganu, Malaysia; Politeknik Melaka (PMK) Malaysia; Iloilo Science and Technology University (ISAT-U) Philipina; Politeknik Kota Kinabalu; Universiti Teknologi Malaysia; The National University of Malaysia; National Chin-Yi University of Technology (NCUT); Accounting Research Institute UiTM-Malaysia; Management and Science University Malaysia; AlBaha University, KSA, Saudi Arabia; Politeknik Melaka (PMK), Malaysia; Kuantan Community College, Pahang, Malaysia; Universiti Brunei Darussalam; and Ferdowsi University of Mashhad, Iran.

Welcome to all of the researchers that become the collaborators in our research and community service. It is our great honour to have you as our collaborators and participants in the 5th FIRST and the 3rd SNAPTEKMAS 2021.

The honourable keynote speakers, distinguished guests, all participants, ladies and gentlemen,

In this chance, I would like to say thank you very much to the Director of State Polytechnic of Sriwijaya for his full support in the development of the Research and Service Community programs. Due to his hard work and his belief to all of the committee so that this event can be held.

In this occasion, I also would like to convey my big thank to all of the keynote speakers, invited guests, all the participants, all reviewers, and all committee of the 5th FIRST and the 3rd SNAPTEKMAS 2021. Without you all, this event will be nothing. May Allah SWT gives His reward for your sincerity. As the time goes by, it is hoped that our cooperation and coordination in the FIRST and SNAPTEKMAS can be maintained and improved. I hope that you can enjoy this conference and can get a big benefit from this event. I also wish that we can meet again in the forthcoming FISRT ad SNAPTEKMAS

Wassalamu'alaikumwaraahmatullahi wabarakatuh

FOREWORD FROM DIRECTOR OF STATE POLYTECHNIC OF SRIWIJAYA



The honorable, FIRST 2021 and SNAPTEKMAS 2021 keynote speakers,

Dra. Nana Yuliana, MA., Ph.D., as The Indonesian LBBP Ambassador for the Republic of Cuba, accredited to the Bahamas, Republic of Dominican, Republic of Haiti and Jamaica

Prof. Ramaraj Boopathy., from U Alcee Fortier Distinguished Service Professor of biological sciences at the Nicholls State University, USA

Dr. Ing. Ahmad Taqwa, MT., as Director of Politeknik Negeri Sriwijaya

Assalamualaikum wr wb,

Let us extend our gratitude to Allah SWT, the most gracious, the most merciful. Due to His bless, we can gather here, at the Opening Ceremony of the FIRST 2021 and SNAPTEKMAS 2021

First of all, Please let me deliver my warm welcome to all keynote speakers and all participant of FIRST 2021 and SNAPTEKMAS 2021. It is my great pleasure to meet and see you in this event.

Although, there are so many obstacles that should be faced in the pandemic situation, however, as young generation, we should be optimistic, stay strong and be active in searching and finding the solution. The FIRST 2021 and SNAPTEKMAS 2021 as the DIES of State Polytechnic of Sriwijaya annual event will become one of the media to support those activities. The researchers could share knowledge, find partners, and enlarge the collaboration through this event.

Based on the change in the model of the teaching learning activity that focuses on the MERDEKA BELAJAR, State Polytechnic of Sriwijaya has a big desire in getting acceleration in the internationalization of the institution. One of them by improving the overseas and industrial collaboration, especially in joint research and joint publication. In the beginning of 2021, the research and community service unit in Politeknik Negeri Sriwijaya has launched new schemes of research and community service, namely the Overseas Collaboration Research and Overseas Collaboration Community Service. Thanks to God, those schemes have attracted researchers not only from Asia but also several other countries outside Asia, such as: research and community service collaboration with Al Baha University from Saudi Arabia, with Ferdowsi University of Mashhad from Iran, and with Princess Sumaya University of Technology from Jordan, as well as several other foreign universities.

In this occasion, I also would like to welcome all the researchers that become the collaborators in our new scheme of research and community service. It is our great honour to have you as our collaborators.

The honourable participants,

At this time, State Polytechnic of Sriwijaya has held 5 times of FIRST. FIRST publications from previous conferences have been successfully indexed not only in SCOPUS, but also in WOS. This 5th FIRST seminar will be conjugated with the 3rd National Seminar on Community Service SNAPTEKMAS. (National seminar of applied technology for public). All of these are the efforts to improve the quality of Polsri lecturers which significantly have a positive effect on the learning process of Polsri students.

Before ending my speech, I would like to congratulate the participants of The FIRST 2021 and SNAPTEKMAS 2021. May the noble efforts, support, and cooperation of researchers in this conference will continue. Special thanks to the organizer and co-organizer committee of The FIRST 2021 and SNAPTEKMAS 2021 for the hard work and the commitment in realizing this conference. Do maintain the spirit of working in a team and continue to unite in order to display a culture of excellence in the eyes of the country and the world.

With Bismillahirrahmanirrahim, I officiate The FIRST 2021 and SNAPTEKMAS 2021.
Wassalamu'alaikum warrahmatullahi Wabarakatu

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KEYNOTE SPEAKER



Dra. Nana Yuliana, MA., Ph.D.

The Indonesian LBBP Ambassador for the Republic of Cuba, concurrently with the Commonwealth of the Bahamas, Jamaica, the Dominican Republic and Haiti

Her Excellency Ambassador Nana Yuliana, Ph.D arrived in Havana, Cuba on December, 23rd, 2020 to serve her duties as the Ambassador Extraordinary and Plenipotentiary of the Republic of Indonesia to Republic of Cuba, Commonwealth of Bahamas, Dominican Republic, Republic of Haiti and Jamaica. She was appointed by the President of the Republic of Indonesia on October 19th, 2020. Prior to her position as Ambassador Extraordinary and Plenipotentiary, she was Consul General of the Republic of Indonesia in Houston, Texas, United States of America from 2017 –2020, after she was the Director of Mid-Career Diplomatic School at the Ministry of Foreign Affairs of Indonesia from 2014 – 2017. Her first diplomatic assignment was as First Secretary of Political Affairs at the Embassy of Indonesia in Manila from 2001-2005. From 2008 to 2012, she was the Counsellor of Economic Affairs of the Embassy of Indonesia in Bangkok and Permanent Representative of Indonesia to the United Nations Economic and Social Commission for Asia and Pacific (UNESCAP). She attended several meetings related to Millennium Development Goals (MDGs) or Sustainable Development Goals (SDGs) issues. Her bachelor's degree was English Education from Institute of Teacher's Training in Jakarta, then she pursued her Master Degree in Applied Linguistics for Macquarie University in Sydney, Australia and also International Relations from University of Indonesia in Jakarta, Indonesia. She completed her Doctoral Degree in Development Studies from the University of Santo Tomas, Manila, Philippines in 2006. While serving as a diplomat since 1995, her passion in teaching and learning encourages her as well to share her knowledge and teaches at the University in Jakarta, Indonesia. During her tenure as Consul General, she was very active in promoting Trade, Tourism, Inbound and Outbound Investments and very keen to engage with Universities for cooperation in human capital development.

KEYNOTE SPEAKER



Prof. Ramaraj Boopathy

Alcee Fortier Distinguished Service Professor of biological sciences
at the Nicholls State University, USA

Fulbright Scholar Fulbright Senior Specialist World Class Professor-Government of Indonesia. Honorary Visiting Professor, ITB, Indonesia Alcee Fortier Distinguished Service Professor John Brady Endowed Professor in Biological Sciences Nicholls State University Business Address: Alcee Fortier Distinguished Service Professor John Brady Endowed Professor in Biological Sciences Department of Biological Sciences Nicholls State University Thibodaux **EDUCATION:** B.Sc. Zoology, University of Madras, India; 1979 M.Sc. Environmental Biology, Tamil Nadu Agricultural University, India; 1981 Ph.D. Environmental Biology, University of Madras, India; 1986 **UNIVERSITY RESPONSIBILITIES:** Responsibilities include Teaching Environmental Biotechnology, a Senior and Graduate level course, Marine and Environmental Biology (Graduate Course), Microbiology and Environmental Biology courses. Research interests include Bioremediation of Hazardous Chemicals and Anaerobic Microbiology. Service includes advising students, participate in Departmental and University committees and serving the local and regional communities. Advisor to Masters Program in Marine and Environmental Biology. **PROFESSIONAL EXPERIENCE:** January 2013 – Present: John Brady Endowed Professor in Biological Sciences, Department of Biological Sciences, Nicholls State University, Thibodaux. Teaching, Research, and Service to the University and Community. August 2012 – Present: Alcee Fortier Distinguished Service Professor, Department of Biological Sciences, Nicholls State University, Thibodaux. Teaching, Research, and Service to the University and Community. August 2004 – Present: Distinguished Service Professor, Department of Biological Sciences, Nicholls State University, Thibodaux. Teaching, Research, and Service to the University and Community. **MAJOR AREAS OF RESEARCH INTERESTS:** Anaerobic digestion, Composting, Biodegradation of hazardous chemicals. Antibiotic resistant bacteria and Antibiotic resistance genes in the aquatic ecosystem. Isolation and identification of novel bacteria. Anaerobic degradation of explosive chemicals with particular reference to sulfate reducing bacteria. Design and development of biological reactor systems. Microbial immobilization of

heavy metals and radionuclides. Alcohol production from agricultural residues. Water quality in the wetlands. Alternative to sugarcane burning, Biological control of termites. Organic ways to control land loss and coastal restoration.

KEYNOTE SPEAKER



Dr. Ing. Ahmad Taqwa, MT.

Director of Politeknik Negeri Sriwijaya Indonesia


Director of State Polytechnic of Sriwijaya, other than that, he is still active at Head of The Research and Publication Commission Forum Director of State Polytechnical In Indonesia, Founder of The Online Journalist Board (IWO) Sumsel, Chairman of The Advisory Board of UKM Nusantara Palembang and Assessor of Higher Accreditation Board. **EDUCATION:** Diplom Ingenieur Electrical Engineering HTL, Ingenieurschule Beider Basel, Switzerland; 1994, Magister (2005) and Doctoral (2010) at Electrical Engineering, Bandung Institute of Technology, Indonesia. **RESEARCH:** Head of Research Assignment “Mini PLTS Periodic Cooling System to Overcome Overheating in Palembang City” (2019), Member of The Research Assignment “Effects of Sea Salt Dust Collection on Output Loss and Solar Panel Output Efficiency” (2020), and Head of Research Assignment “Design and Build of Wireless Sensor Network Prototype Detection Of Landslides Based on IOT and LORA” (2020). **DEDICATION:** “The Design and Evaluation of Virus Scan in The E-Mail System in SMA N 5 Palembang” (2018), Assignment Service “Utilization of WSN Technology in Parking Air Monitoring Foundation SMP Harapan Mulia Palembang” (2019), Development of Teaching Materials with Interactive Multimedia with Education Game for Harapan Mulia Junior High School Students” (2020). **AWARD:** Certificate In Participating In The 200 Hour Advanced Technical Teacher Training awarded by FONTYS and PEDC (1998), Satyalancana Karya Satya X Year 2011 And Satyalancana Karya Satya XX Year 2017 by The President of The Republic of Indonesia. **WORKSHOP:** Seminar and Focus Group Discussion Forum The Rector of Indonesia “Economic Stability In The Vuca Area”, Ujung Pandang (2020), Workshop on Using Integrated Resources Information System Applications For Lecturers of State Polytechnical Polytechnic, Palembang (2019) And Workshop of Learning Methodology of Polsri Lecturers and Outside Education Domicile (PDD) as a Source Person, Palembang (2019).

RUNDOWN
The 5th FIRST 2021 INTERNATIONAL CONFERENCE
(FORUM IN RESEARCH SCIENCE AND TECHNOLOGY)
SNAPTEKMAS (Seminar Nasional Aplikasi Teknologi pada Masyarakat) 2021
Palembang, South Sumatera, Indonesia
Thursday, October 21, 20201

		Thursday, October 21, 20201			
No.	Session	Person in Charge	Time Allotment (WIB)	Liaison Officer	
1.	Registration	Event Section Committee	07.00 – 08.00	Doeslohal Djumrianti, S.E.MIS., Ph.D	
2.	The Opening Ceremony				
3.	Do'a				
4.	Indonesian National Anthem				
5.	Chair Report Speech	Event Section Committee	08.00 – 09.00		
6.	Speech and Opening Remarks by Director of State Polytechnic of Srijijaya				
7.	Souvenirs Gift, Group Photos				
PLENARY SESSION					
No.	Keynote Speaker	Affiliation	Time Allotment (WIB)	Moderator	Liaison Officer
1.	Dra. Nana Yuliana, MA., Ph.D.	The Indonesian LBBP Ambassador for the Republic of Cuba, concurrently with the Commonwealth of the Bahamas, Jamaica, the Dominican Republic and Haiti	09.00 – 10.00	Tiur Simanjuntak M.Pd.	Doeslohal Djumrianti, S.E.MIS., Ph.D
2.	Prof. Ramaraj Boopathy	Alcee Fortier Distinguished Service Professor of biological sciences at the Nicholls State University, USA	10.00 – 11.00	Prof. Hasan Basri	Dr. Nyayu Latifah Husni, M.T.
3..	Dr. Ing. Ahmad Taqwa, MT.	Director of Politeknik Negeri Srijijaya, Indonesia	11.00 – 12.00	Jaksen M. Amin, M.Si.	Dr. Martha Aznury, S.Pd., M.Si.

PARALLEL SESSION

No.	Theme	Room	Time	Moderator	Articles
1.	TRACK 1 (Engineering and Science)	1	13.00 – 16.00	Dr. Eng Tresna Dewi, M.Eng./ Ika Sulianti, ST, MT	15
2.	TRACK 1 (Engineering and Science)	2	13.00 – 16.00	Dr. Martha Aznury, M.Si./ Indah Purnamasari, M.Eng.	14
3.	TRACK 1 (Engineering and Science)	3	13.00 – 16.00	Fatahul Arifin, M.Eng, Ph.d./ Dr. Indrayani, S.T., M.T.	13
4.	TRACK 2 (Computer Science, Computer Engineering, Information System, Informatics Management)	4	13.00 – 16.00	Rika Sadariawati, M.Si./ M.Miftakul Amin, S.Kom., M.Eng	13
5.	TRACK 2 (Computer Science, Computer Engineering, Information System, Informatics Management)	5	13.00 – 16.00	Dr. Nyayu Latifah H, MT./ Lindawati, S.T., M.TI	12
6.	TRACK 3 (Social Science)	6	13.00 – 16.00	Doeslohah Djumrianti, S.E.MIS., Ph.D/ Dr. Marieska Lupikawati	13
7.	TRACK 3 (Social Science)	7	13.00 – 16.00	Dr. Sari Lestari ZR/ Dr. Rita Martini	14
8.	SNAPTEKMAS 1	8	13.00 – 16.00	Yumi Oklarina, ST, MT/ Mouland Irwadi, SE. M.Si.	15
9.	SNAPTEKMAS 2	9	13.00 – 16.00	Leni Novianti, M.Kom./ Maivi Kusnandar, M.Kom	15
10	SNAPTEKMAS 3	10	13.00 – 16.00	M Husni Mubarak, M.Si./ Martinus Mujur, ST, MT	15
11	SNAPTEKMAS 4	10	13.00 – 16.00	Dr. Ade Silvia H, MT./ M. Sopian Soim, ST, MT	13



CLOSING SESSION

Event	Time	Room
<ul style="list-style-type: none">- Closing Ceremony- Announcement of:<ol style="list-style-type: none">1. Best Paper FIRST IC 20212. Best Paper SNAPTEKMAS 20213. Best Presenter FIRST IC 20214. Best Presenter SNAPTEKMAS 2021- Quiz Online	16.00– 17.00	Main Room

TRACK 3 (Social Science)

ROOM : 6
 TIME : Thursday, 21 October, 2021/ 13.00 - 16.30
 ARTICLES : 13
 MODERATOR : Doeslohal Djumrianti, S.E.MIS., Ph.D/ Dr. Marieska
 Lupikawati

NO	Time	ID	AUTHORS	TITLE	AFFILIATION
1	13.00-13.10	3847	Ayu Chotibah, Bainil Yulina, Desi Apriyanty, Evada Dewata, Pridson Mandiangan	THE INNOVATION OF SOUTH SUMATERA TRADITIONAL BATIK E-COMMERCE APPLICATIONS	State Polytechnic of Sriwijaya
2	13.10-13.20	3683	M. Thoyib, Riza Wahyudi, Firmansyah, Darul Amri	THE ANALYSIS OF COST QUALITY ON PRODUCTIVITY OF IRON RAILING PRODUCTS IN SMALL AND MEDIUM BUSINESS IN PALEMBANG	State Polytechnic of Sriwijaya
3	13.20-13.30	3757/3756	Nelly Masnila, Firmansyah, Jovan Febriantoko, Riana Mayasari, Jamaliah Said	Quality of Financial Reporting and Impact of GGG Implementation: Study on Local Government in Indonesia	State Polytechnic of Sriwijaya
4	13.30-13.40	3796	Evi Agustina Sari, Sri Gustiani, Yusri, Tiur Simanjuntak	An Error Analysis of English Sentence Construction in Writing Subject Made by the Students of the English Department at Sriwijaya State Polytechnics	State Polytechnic of Sriwijaya
5	13.40-13.50	3827	Edwin Frymaruwah, Farah Aida Ahmad Nadzri, Periansya, Evada Dewata	DISCLOSURE OF SUSTAINABLE PERFORMANCE IN HIGHER EDUCATION IN INDONESIA	State Polytechnic of Sriwijaya, UiTM
6	13.50-14.00	3976	Hendra Hadiwijaya Febrianty Rezania Agramanisti Azdy	Improvement of LPKA Class 1 Palembang Electronic Dashboard with Field Performance Monitoring	Palcomtech Polytechnic, STMIK PalComTech
7	14.00-14.10	3853/4034	Neneng Miskiyah, Purwati, Yulia Pebrianti, Keti Purnamasari, Nyimas Miftahul Jannah,	OPTIMIZATION OF INCOME PARAMETERS OF SONGKET CRAFTSMEN ON KOPERASI SONGKET PALEMBANG	State Polytechnic of Sriwijaya

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Modelling Design Diffuser Horizontal Axis Wind Turbine

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ABSTRACT

The Wind power is one of the promising energy technologies, which can utilize wind energy as a source of renewable energy. So, in this case which a tool is needed, namely a wind turbine, but one of the problems that increase the wind speed in a low wind speed area. It must develop a device to increase the wind speed. Due to this case has been developed to use the Concept of Diffuser Augmented Wind Turbine (DAWT) to control wind speed in low wind speed areas now. With the difference in inlet pressure and outlet pressure, the diffuser is able to increase wind speed. In this case, a design simulation using ANSYS is shown to investigate the Horizontal Axis Wind Turbine (HAWT) performance in low wind speed areas by applying DAWT technology and modifying the diffuser angle. The diffuser angle variation was in the range 4°-12° and the diffuser length to diameter (L/D) was in 0.5D - 1.0D. The simulation results indicated a similarity with the literature which found the improved power.

Keywords: *wind energy, diffuser, turbine*

1. INTRODUCTION

One of the fast growing renewable energies is wind energy. Wind energy has long been recognized and applied by humans, for instance, for the power generation, but wind energy in the Indonesian region is categorized as low wind speed. However, wind potential in Indonesia is obtainable almost all over the year, making it possible to advance small-scale power generation systems. One of them is the manufacture of wind turbines, which will later help generate electricity and encounter the community's electricity requirements.

Many researchers have done the experiment by using the various type of wind turbine. Kamal et.al. used the four blade-blade Darrieus wind turbine for low speed area in Tanjung Enim South Sumatera [1], the Irawan et. al. studied three blade wind turbine for collecting wind in the settlement in Muara Enim [2]. Germana et. Al. applied the combination of

Savonius and Darrieus wind turbine in the mining area od PT. BA South Sumatera [3]. They found that wind turbine has the great future to develop in the South Sumatera area.

DAWT, Diffuser Augmented Wind Turbine, can be a promising solution to overcome those problems by adding a shroud to the turbine, then, might increase the power output of wind turbines [4-6]. DAWT technology has developed in the early 1950s where the results obtained flow velocity 1.3 times higher than the freestream velocity [7]. These theoretical results were then carried out by experiments on small-scale wind turbines with a shroud and obtained an increase in power by 4% compared to without a shroud in wind turbines [8].

Putra et al [9] obtained the wind speed profile around the diffuser which earlier changed the diffuser in the form of supplementary inlet and flange curvature. Advance study on wind speed in

DAWT was carried out by unpredictable the diffuser types, namely the camber diffuser and the uniform diffuser [10]. Ahmed et al [11] stressed the superiority of this DAWT performance where there are 3 diffuser design parameters that is able to enhance mass flow and wind speed, explicitly the length, height and the diffuser angle.

To solve the design problem some researchers such as Germana et. al [3] applied the Solidwork solve the problem in the design of the Savonius and Darrius turbine. Susandi et. al. [12] used ANSYS conducted the numerical study of the horizontal wind turbine.

In this study is to model the diffusers on horizontal axis wind turbines based on the angle and length of the diffuser. The analysis is made on a three blades horizontal axis wind turbine with the use of a diffuser with the angle 4°, 8°, 12°.

The purpose of this experiment to find the optimal design of diffuser of VAWT.

2. METHODOLOGY

The steps of the study are reviewing literature, running CFD simulation, designing and manufacturing wind turbine, finally collecting data. The flowchart of study can be seen in figure 1.



Figure 1 Research Flow Chart

The diffuser model assimilated three major parameters, which are, the inlet diameter of diffuser (D), the angle of diffuser (Θ), and the diffuser axial length (L). The diffuser used is shown in figure 2. The diffuser length (L) is the distance between the diffuser inlet and outlet. The diffuser inlet diameter (D) is equal to the diffuser throat, which is the slimmest part of the diffuser.

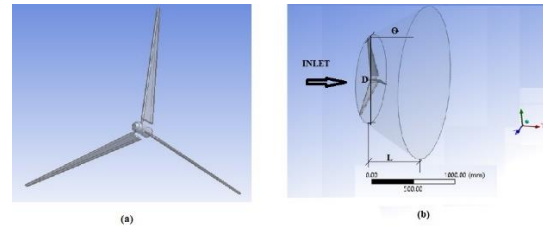


Figure 2 Modelling Design Blade and Diffuser of Horizontal Axis Wind Turbine

The equation 1 shows the calculation of the amount of power generated in the diffuser based on density, area, and velocity [7] (Bussel. (2007).

$$P = \frac{1}{2} A \rho v^3 C_p \tag{1}$$

Where; *P* is power (W), ρ is air density (1.225 kg/m³), *A* is turbine swept area (m²), and *v* is wind speed (m/s), and *C_p* is coefficient of power. In this paper, *C_p* = 0.59 is the value of maximum theoretically for the wind turbine, which is called as the *Betz Limit* [13].

3. RESULT AND DISCUSSION

The wind turbine was experienced for a magnitude speed of 5.5 m/s in Ansys Fluent. The contour of velocity variation inside the diffuser in this presented paper is shown in Fig. 5 at an angle of diffuser 4°, 8°, 12°; L = 1.0D, and D = 600 mm. It is shown that in lower diffuser angle, i.e. 4°, 8°, 12°, the highest speed inside the diffuser 5.5 m/s, was assembly all over the place the wind turbine.

As shown in figure 3-4, the wind enters the diffuser with the high velocity and then out the diffuser with low velocity. The best profile velocity contour can be obtained at a higher diffuser angle, and then the diffuser length gave an excellent performance from 0.5D until 1.0D.

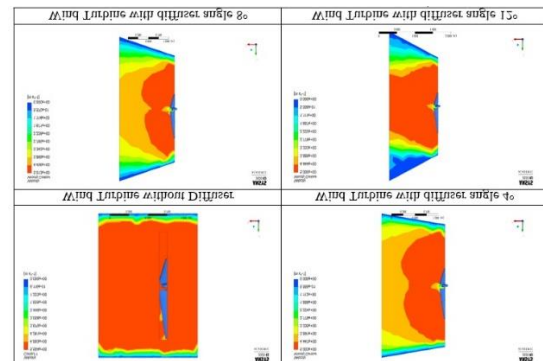


Figure 3 Wind Turbine without Diffuser and with diffuser angle 4°, 8°, 12°

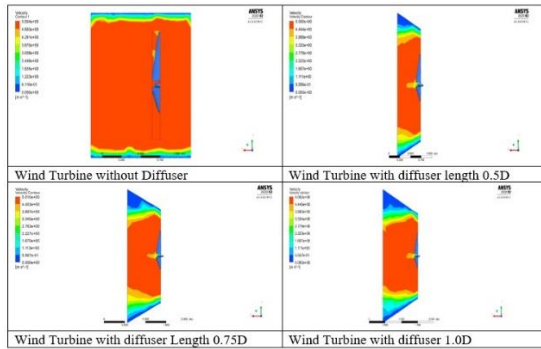


Figure 4 Wind Turbine without Diffuser and with Diffuser Length 0.5D, 0.75D, 1.0D

The outcome directed the exist of the effect of diffuser angle into the increase speed inside the diffuser. Additionally, the contrast was also carried out with the non-diffuser wind turbine. The flow of velocity contour of non-diffuser wind turbine is shown in figure 3 and 4. It can be seen that the non-diffuser wind turbine can only concentrate the mass flow of wind at the highest velocity. The best profile of shape velocity can be achieved at a higher diffuser angle. So, it directs that the diffuser augmented wind turbine can harvest more power than the base wind turbine and it is hopeful to install at low wind speed.

4. CONCLUSION

This investigation presents the CFD analysis of diffuser HAWT where the speed was calculated for dissimilar flow velocities and compared with those of non-diffuser wind turbine. The analysis express that the wind turbine performance, in view of the wind speed and generated power, is able to be significantly increased by placing it inside the diffuser. Based on simulations result, it can be concluded that a properly designed diffuser into HAWT is attractive and promising technology to increase mass flow of wind, particularly at low wind speed area.

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