# BAB VII
# KESIMPULAN

Simulasi numerik telah dilakukan pada semua konfigurasi penelitian sehingga menghasilkan beberapa hal penting. Bentuk leading edge dari sayap mempengaruhi terjadinya vorticity pada area di belakang nya sampai dengan trailing edge karena aliran dan vorticity selaku berkembang di sepanjang upper surface. Bantuk leading edge yang lurus dan melengkung akan mempengaruhi seberapa besar dan kecepatan perkembangan dari vorticity. Hal ini dapat dilihat dari jejak skin friction magnitude contour di sepanjang upper surface.

Pada area yang mendekati wingroot, perkembangan vorticity terjadi lebih besar karena pengaruh aliran tiga dimensi karena interaksi main flow dan dinding dari sayap yang sering disebut sebagai fuselage. Hal ini menyebabkan adanya cross flow yang bergerak ke arah midspan dan bahkan bergeser saling mempengaruhi ke arah wingtip. Pada sisi wingtip, fenomena vorticity dan cross flow ini tergeser dengan terjadinya fenomena tip vortexyang merupakan lompatan aliran fluida dari lower surface menuju upper surface.

Lompatan aliran fluida ini tidak tepat di bagian atasnya namun bergeser ke belakang dari upper surface. Hal ini menimbulkan gerakan memutar sehingga menimbulkan bekas pada upper surface. Jejak ini semakin meluas sampai dengan trailing edge dan tetap bergerak memutar di belakangnya sehingga menghasilkan vortex. Vortex yang dihasilkan di belakang wingtip ini lebih besar dibandingkan area yang lain.

Fenomena ini dilakukan pada kondisi cruising dan dapat dikembangkan pada kondisi yanglain misalnya take-off dan landing. Pergerakan lain juga sangat menarik untuk diamati misalnya pada kondisi yawing atau rolling yang menyebabkan vorticity dan performa aerodinamika sangat dinamis. Penambahan high lift devices juga perlu dipertimbangkan untuk menaikkan performa aerodinamika dan memperkecil terjadinya vorticity pada bagian upper surface.

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**SURAT PERNYATAAN**

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Dengan ini menyatakan bahwa apabila proposal penelitian saya dengan judul Studi Perbandingan Planform Wing Pada Airfoil NACA 65-415 Di Pesawat PA34-220T Piper Seneca V diterima **maka saya menyatakan sanggup melaksanakan penelitian sampai dengan tahap akhir penelitian ini**. Bilamana di kemudian hari ditemukan ketidaksesuaian dengan pernyataan ini, maka saya bersedia dituntut dan diproses sesuai dengan ketentuan yang berlaku dan menerima konsekuensi sesuai yang tertera dalam kontrak penelitian.

Demikian pernyataan ini dibuat dengan sesungguhnya dan dengan sebenar-benarnya.

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Dengan ini menyatakan bahwa proposal penelitian saya dengan judul Studi Perbandingan Planform Wing Pada Airfoil NACA 65-415 Di Pesawat PA34-220T Piper Seneca V yang diusulkan dalam Penelitian Politeknik Penerbangan Palembang untuk tahun anggaran 2024 **bersifat orisinal dan belum pernah dibiayai oleh lembaga/sumber dana lain**. Bilamana di kemudian hari ditemukan ketidak sesuaian dengan pernyataan ini, maka saya bersedia dituntut dan diproses sesuai dengan ketentuan yang berlaku dan mengembalikan seluruh biaya penelitian yang sudah diterima ke kas negara.

Demikian pernyataan ini dibuat dengan sesungguhnya dan dengan sebenar-benarnya.

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# VORTICES CHARACTERISTICS AROUND WING AIRFOIL NACA 65(2)-415 WITH DIFFERENT WING SHAPE

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## Abstract

The choice of wing shape is basic in the selection of aircraft because it affects all conditions that occur throughout the aircraft. Vorticity is one of the effects caused by the choice of wing shape, which involves the movement of fluid flow on the upper surface of the wing. This vorticity cannot be eliminated but can be minimized to produce the best conditions on the wing. This study uses a wing with NACA 65(2)-415 airfoil using twelve kinds of angle of attack. This numerical simulation uses the k-ε Realizable turbulent model with three types of configurations observed, namely plain, elliptical, and Scheumann wing. From the results, it is found that the shape of the wing greatly affects the occurrence of vorticity patterns on the upper surface and the area behind the trailing edge of the wing. Vorticity growth is faster at the wingroot and midspan. At the wingtip, vorticity growth is shifted by the occurrence of the tip vortex phenomenon which causes the vortex that occurs behind the wing to be larger than other areas. The size of the tip vortex is also influenced by the chordline length at the wingtip because it greatly affects the speed of growth and development.

Keywords: NACA 65(2)-415, tip vortex, vorticity, wing, chordline.

## Introduction

Talking about wing planform will be related to the separation and stall patterns of the wing. In addition to aerodynamic performance, the issue of stall behavior that begins with separation is closely related to wing shape. Apart from the difficulty of the wing manufacturing process, the stall behavior factor is the ultimate goal of choosing the wing planform chosen by aircraft designers. Stall behavior begins with the interaction between the main flow from the leading edge and the upper surface of the wing. The interaction produces several conditions that ultimately result in massive separation resulting in a stall.

In general, the separation starts from the trailing edge area, but the separation may start from the leading edge. This is due to the separation bubbles that arise due to surface roughness. Generally, the separation that occurs at the leading edge will reattach to the wing surface. The phenomenon of separation at the leading edge can be more seen in airfoils that show its evolution in more detail. Separation can also occur at the wing root area where there is an intersection between the wing and the surface of the aircraft wall.

Separation in this area is caused by the angle of attack and geometry between the wing and fuselage.(Gudmundsson, 2013)(Azargoon et al., 2020)

Some researchers have identified various types of incremental stalls while looking at the process by which they occur. Dynamic stall is often said to occur in helicopter rotors (Gardner & Richter, 2013)(Q. Wang et al., 2015). However, some experts often mention that dynamic stall occurs when the aircraft moves suddenly, causing a sudden high angle of attack. This movement usually occurs due to aircraft maneuvers that cause a combination of yawing, rolling, and pitching movements. (Choudhry et al., 2014)(Pattermann et al., 2017)(Leknys et al., 2018). Each movement caused by a sudden change in the angle of attack shows a different flow structure. At each angle of attack in addition to showing different flow structures and patterns, it also produces drastically changed drag coefficients, lift coefficients, and pressure coefficients. Other researchers also mentioned the tip stall that occurs in swept planform and tapered wings.(Medina et al., 2019)(Visbal & Garmann, 2019)(Tomek et al., 2020). In the swept-wing planform, the center of gravity is located in front of the wing so that it must be balanced by the wing behind it. In general, the leading edge of the swept-wing planform has the maximum lift coefficient and stall point faster than the shoulder airfoil and trailing edge. This is also due to the tip vortex and downwash on the wing tip side. Shevell (Paterson, 1967) adds another dangerous type of stall, often referred to as a deep stall. Deep stall occurs in air-craft with a T-tail configuration and rear-mounted engines. In a T-tail, the turbulent wake from the wing, engine nacelle, and fuselage covers the horizontal and vertical stabilizers so that the elevators do not function effectively, resulting in a stall (Taylor & Ray, 1965)(P. Wang & Shi, 2010).

Hariyadi et al.(Hariyadi et al., 2022) discusses the stall behavior of rectangular, elliptical, semi-elliptical, and Schuemann-shaped wings. Numerical simulations were performed using the turbulent SST k-ω model using Ansys Fluent 19.1. The airfoil used in this study is Eppler 562 with a Reynolds number of $2.34 \times 10^4$. The observed angles of attack are $0^o$, $2^o$, $4^o$, $6^o$, $8^o$, $10^o$,$12^o$, $15^o$, $17^o$, $19^o$, and $20^o$. The Schuemann wing has the best performance indicated by the delayed stall point, which is at the angle of attack $\alpha = 15^o$, while the rectangular wing produces the highest lift-to-drag ratio compared to the other wing planforms. The confluence of the main flow and the return flow is formed at the center of the span as the angle of attack increases. The rectangular wing produces high vortices at the wing tip region due to the tip-vortex phenomenon, while the elliptical and Schuemann wings are at the leading-edge region due to the leading-edge geometry.

Khalifa et al. (Khalifa et al., 2023) examines the process of dynamic stall through numerical simulations, especially Unsteady-Reynolds-Averaged Navier-Stokes (URANS) and multiple detached eddy simulation (DES) solvers: the Delayed-DES (DDES) and the Improved-DDES (IDDES). The simulation is performed on NACA 0012 with $Re = 1.35 \times 10^5$ after a grid independency study so that the results are close to the experimental results. The lift coefficients generated from 2D and 3D simulations are highly similar. The URANS method is less able to predict the turbulence scale of the simulation than other methods. The IDDES method shows that there is a gradual buildup and merging of vortices so this process results in a dynamic stall. The size and timing of the vortices match between the numerical simulation and the experimental results.

Bashir et al. (Bashir et al., 2023) investigated the dynamic stall pattern of the UAS-S45 aerofoil wing. The wing was compared with the addition of the morphing leading edge (MLE) and the morphing trailing edge (MTE) at $2.4 \times 10^6$. Validation is done by comparing the numerical simulation lift coefficient with the results obtained from

experiments. The addition of the morphing leading edge (MLE) can minimize the streamline slope of the adverse pressure gradient, delay the separation, and suppress the occurrence of dynamic stall vortices (DSV). However, although the morphing leading edge (MLE) can delay the separation and increase the lift coefficient, the dynamic stall cannot be suppressed by the addition of the morphing leading edge (MLE).

This study investigates the role of different wing shapes on the aerodynamic performance of NACA 65(2)-415. The rectangular wing without the addition of high lift devices (plain wing) is compared with other configurations of Schuemann and elliptical wing. Numerical simulation conditions are adjusted to the situation at cruising speed so that the conditions used are the most stable compared to take off, approaching, and landing. The results were obtained in the form of contour visualization on the upper surface in the form of skin friction, vorticity magnitude, and velocity magnitude to compare the evolution of fluid flow movement from the leading edge to the trailing edge.

## Methods

### Governing Equation

Some of the governing equation involved in this study include:

$$C_p = \frac{p - p_\infty}{\frac{1}{2}\rho U_\infty^2}$$

$$C_f = \frac{\tau_w}{\frac{1}{2}\rho U_\infty^2}$$

Where
$C_p$ = pressure coefficient
$C_f$ = skin friction coefficient
$\tau_w$ = local wall shear stress
$\rho$ = fluid density
$U_\infty$ = free-stream velocity
(ANSYS Fluent Theory Guide, 2013) (Houghton et al., 2013)

### Specification of the Research Model

This study uses a wing with NACA 65(2)-415 airfoil which is used on the Piper Seneca II aircraft which can be seen in Figure 1. The Piper Seneca II aircraft is a multi-engine aircraft that is used for various purposes including training aircraft for prospective aircraft pilots including those used at the Akademi Penerbang Indonesia Banyuwangi (Indonesia Pilot Academy Banyuwangi). To obtain a stable condition in this study, the freestream velocity is selected at cruising speed conditions, which is 97 m/s.




Figure 1. Piper Seneca II

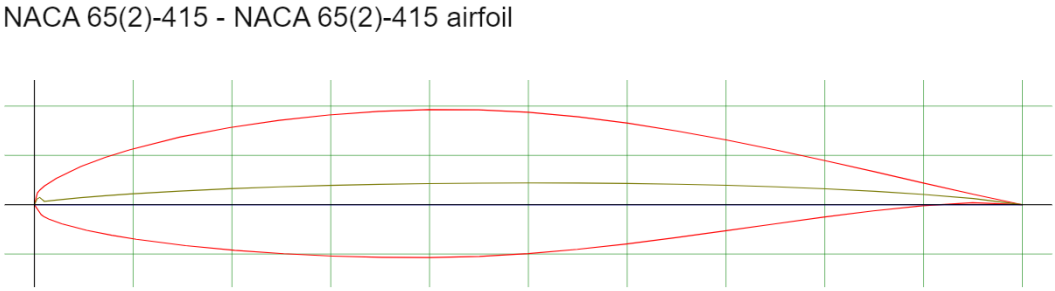



Figure 2. NACA 65(2)-415 (generate result from airfoiltools.com)

Table 1. Research model specification (for plain wing as reference)

| No | Descripsion | Dimension |
|---|---|---|
| 1 | Airfoil Type | NACA 65(2)-415 |
| 2 | Wing Type | Straight Constant Chord |
| 3 | Sweep Angle | 0° |
| 4 | Wing Span | 60 cm |
| 5 | Aspect Ratio | 4 |
| 6 | Chord Length | 20 cm |

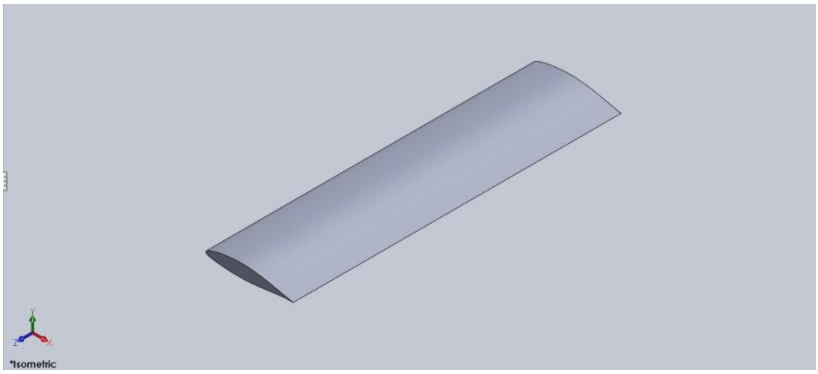



Figure 3. Plain NACA 65(2)-415

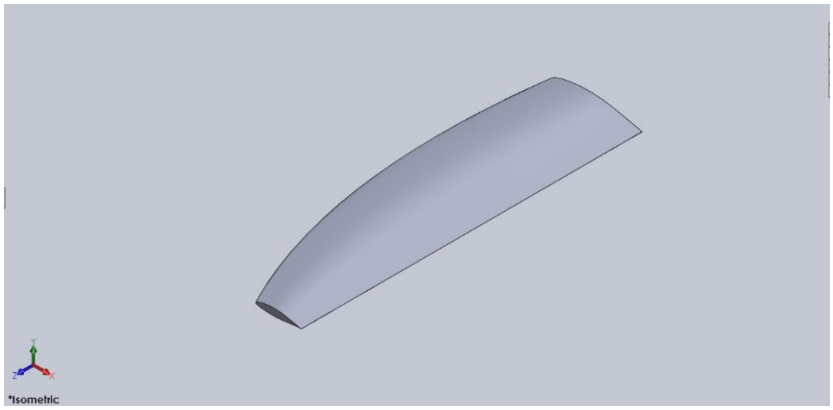



Figure 4. Schuemann Wing NACA 65(2)-415

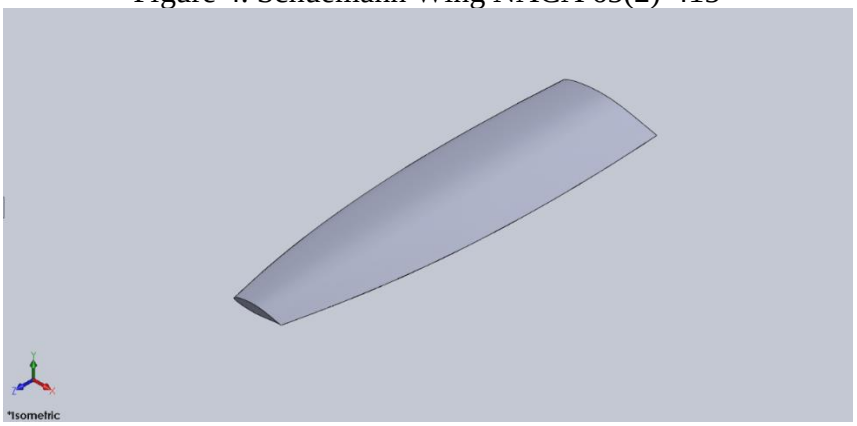



Figure 5. Elliptical Wing NACA 65(2)-415

**Numerical Set-Up**

The boundary conditions for this numerical simulation are shown in Figure 6 below.

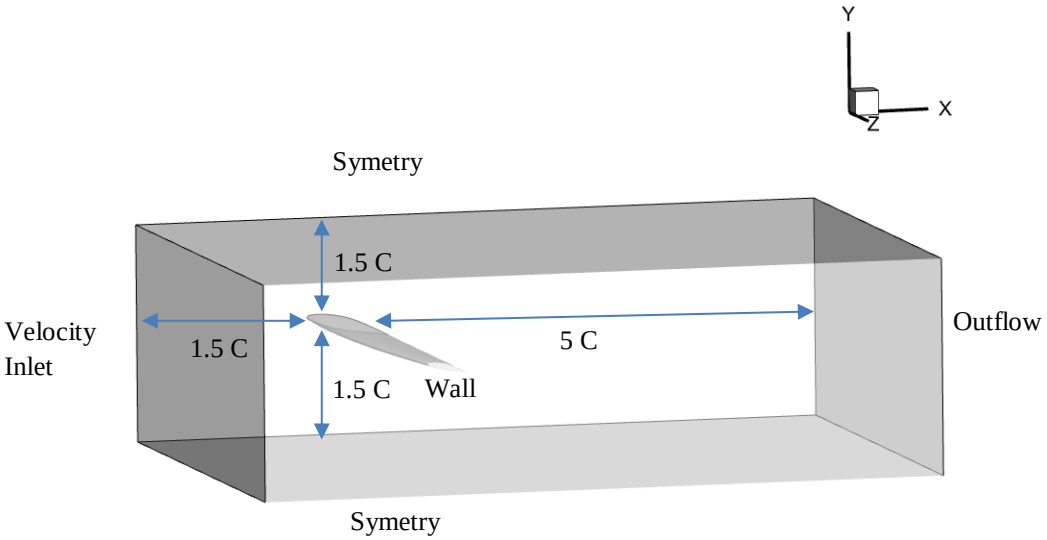



Figure 6. Boundary Condition according to Putro et al. research (Putro et al., 2022, 2024)

## Grid Independence

Grid Independence is a method to determine the optimum point of a trial value. It should be understood that the use of the number of elements in numerical modeling affects the results. The more elements, the more accurate the results but the longer the running time. The optimum point is the point where the results show accuracy with the minimum number of elements possible. In addition, another consideration is based on Anderson (Anderson Jr, 1995), The most optimal results are obtained when the difference in drag coefficient with the previous meshing is approximately 2%.

In this study, to get the best results, the y+ used is less than 1 as done in Kontogiannis's research. (Kontogiannis et al., 2016; Kontogiannis & Ekaterinaris, 2013). Based on Table 2, $C_D$ values that tend to be smaller occur in Meshing A. One consideration in performing numerical simulations is the time and memory used, so the meshing used for the next simulation is Meshing D.

In this step, the flow characteristics are modeled, including the selection of the solver model and the determination of the turbulence model used. The solver used is unsteady. The turbulence model used for this airfoil is the k-ε Realizable model as presented by Mulvany et al. (Mulvany et al., 2004).

Table 2. Grid Independence Analysis of NACA 65(2)-415 Plain Wing Model

| Number of *Mesh* | Number of Node | $C_D$ | y+ | Skewness Average |
|---|---|---|---|---|
| Mesh A | 952.426 | 0.09 | 0.04 | 0,326 |
| Mesh B | 894.019 | 0.16 | 0.12 | 0,324 |
| Mesh C | 823.336 | 0.18 | 0.135 | 0,346 |
| Mesh D | 704.317 | 0.206 | 0.156 | 0,327 |
| Mesh E | 631.784 | 0.277 | 0.222 | 0,315 |
| Mesh F | 493.036 | 0.285 | 0.233 | 0,321 |

# Results and Discussion

## Skin Friction Magnitude Contour

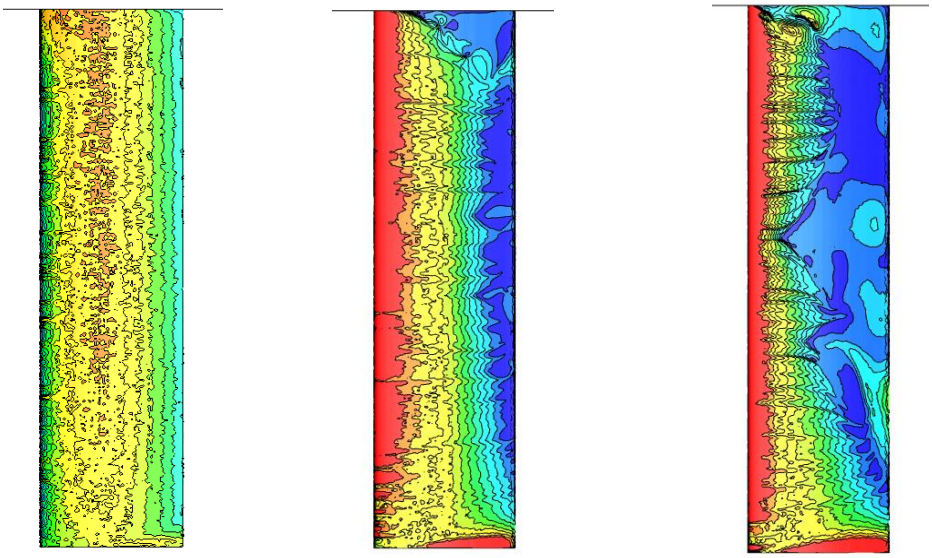
Figure 7 shows the contours of the skin friction magnitude of all study configurations. Skin friction magnitude is a manifestation of fluid flow movement on the upper surface from the leadingedge to the trailing edge. The contour of skin friction magnitude can be compared with the experimental results of oil flow visualization as studied by Dayanti et al. (Dayanti et al., 2023). With oil flow visualization, the movement and traces of vorticity behavior and traces of vortices evolution can be known.

In the plain wing with angles of attack $\alpha = 0^o$, $10^o$, and $14^o$, it can be seen that the vortices develop from the wing root direction. This is seen at $\alpha = 10^o$ where the flow that collides with the fuselage wall develops towards the midspan. At the wingtip region, the downwash trace which is the result of the tip vortex has been seen at $\alpha = 10^o$ and $14^o$ thus breaking the fluid flow movement from the midspan direction. At an angle of attack of $\alpha = 14^o$, it is shown that the area with different skin friction magnitude values is different in the shoulder of the wing area while the area near the trailing edge with the same skin friction magnitude value.

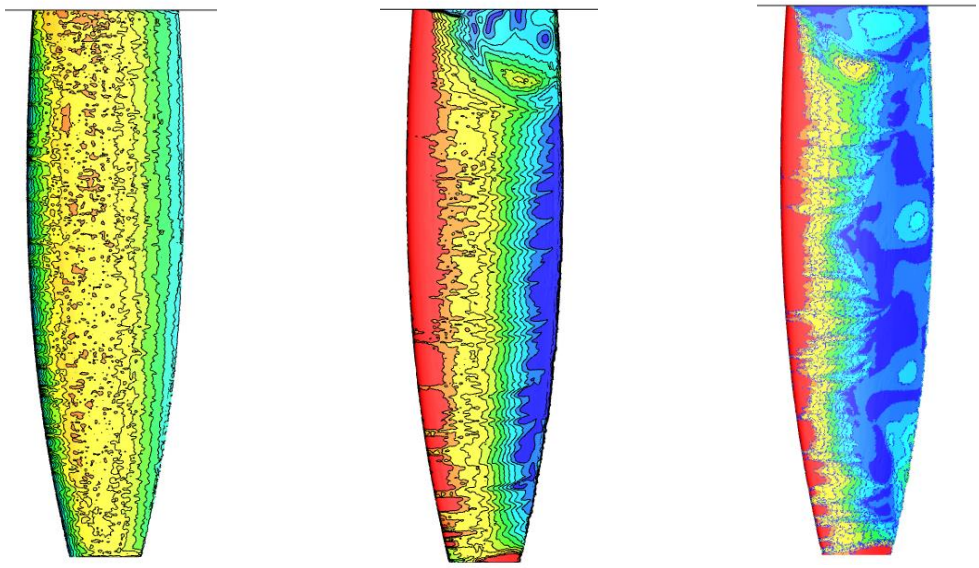
In the elliptical wing with angles of attack $\alpha = 0^o$, $10^o$, and $14^o$, it can be seen that the trace vortices expand evenly from the wingroot and trailing edge sides. This development is faster than in the plain wing configuration. At an angle of attack of $\alpha =$

$10^o$, the development of vortices from the direction of the wingroot and trailing edge begin to meet each other and then expand on all lines as seen at an angle of attack of $\alpha = 14^o$. At the angle of attack $\alpha = 14^o$, it can be seen that the development of vortices has only reached the shoulder of the wing and has not yet reached the leading-edge side as seen in the plain wing. At the wingtip region, the downwash trace which is the result of the tip vortex is visible at $\alpha = 10^o$ and $14^o$ but not as extensive as that produced by the plain wing.

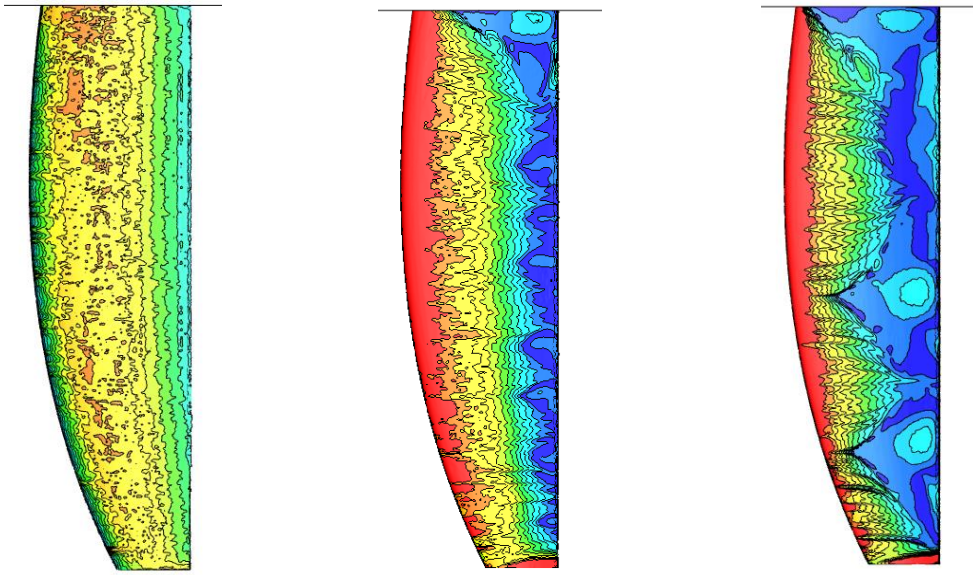
In the Schuemann wing with angles of attack $0^o$, $10^o$, and $14^o$, it can be seen that the trailing vortices expand evenly from the wingroot and trailing-edge sides as in the elliptical wing configuration. At the angle of attack $\alpha = 10^o$, the development of vortices from the wingroot and trailing-edge directions have met each other which then expanded on all lines as seen at the angle of attack $\alpha = 14^o$ exceeding the elliptical wing configuration. At an angle of attack of $\alpha = 14o$, it can be seen that the development of vortices has reached the shoulder of the wing and reached the leading-edge side as seen in the plain wing. At the wingtip region, downwash traces that are the result of the tip vortex are visible at $\alpha = 10^o$ and $14^o$ but not as extensive as those produced by the plain wing.



a) Plain wing $\alpha = 0^o$ b) Plain wing $\alpha = 10^o$ c) Plain wing $\alpha = 14^o$



d) Elliptical wing α = 0° e) Elliptical wing α = 10° f) Elliptical wing α = 14°



g) Schuemann wing α = 0° h) Schuemann wing α = 10° i) Schuemann wing α = 14°

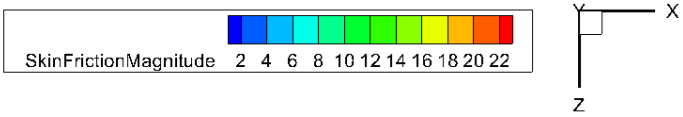


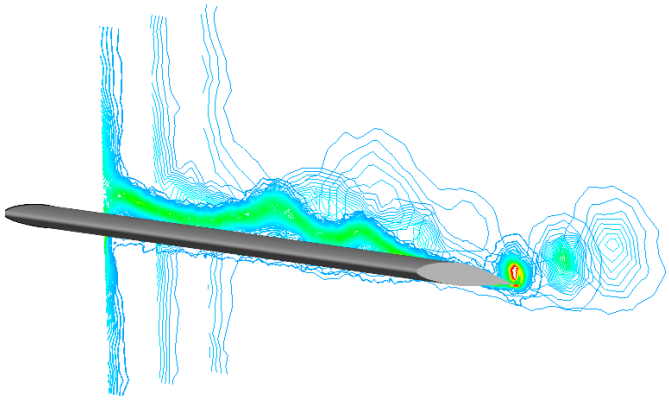

Figure 7. Skin Friction Magnitude Contour

**Vorticity Magnitude Contour**

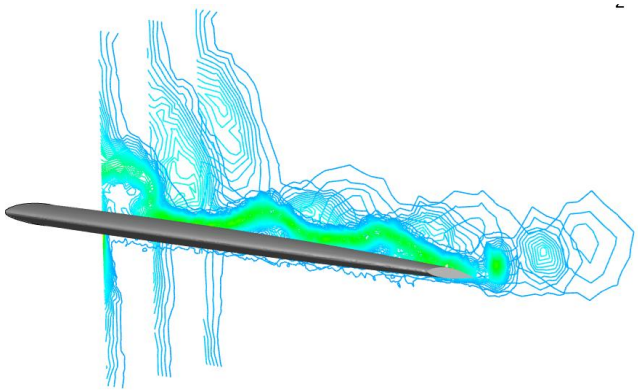
Figure 8 shows the velocity magnitude contours of all study configurations at a distance of one, two, and three times the chordline starting from the leading edge. The angle of attack observed is α = 14°. The pattern formed in the area behind the plain wing wingroot in Figure 8.a), which is just behind the wing, is parallel to the wing but then starts to undulate towards the wingtip. The pattern is a combination of many vorticity magnitudes so that it resembles a wide line. In the area behind the wingtip, the vorticity

looks wider because it is the result of a jump in fluid flow which is often referred to as a tip vortex. In the area twice the chordline behind the wing, the value of vorticity decreases but expands until it reaches the area three times the chordline behind the chordline.

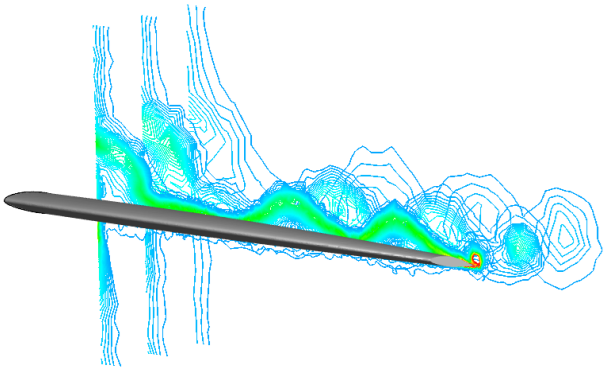
Figure 8.b) shows the velocity magnitude contours of the elliptical wing at a distance of one, two, and three times the chordline starting from the leading edge at an angle of attack $\alpha = 14^{o}$. In the area behind the wingroot, the pattern formed is wavier than the plain wing up to the wingtip. The area formed in the area just behind the trailing edge looks the same as the plain wing configuration but in the area two and three times the chordline behind the leading edge looks narrower. This can be seen in the area behind the wingtip where the effect of the tip vortex appears smaller than the plain wing.



a) Plain wing



b) Elliptical wing



c) Schuemann wing

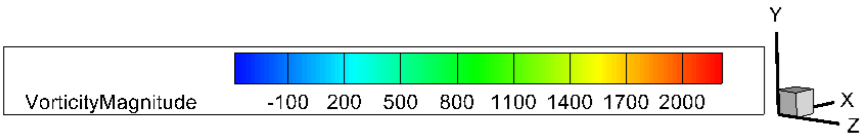



Figure 8. Vorticity Magnitude Contour at $\alpha = 14^o$

**Velocity Magnitude Contour**

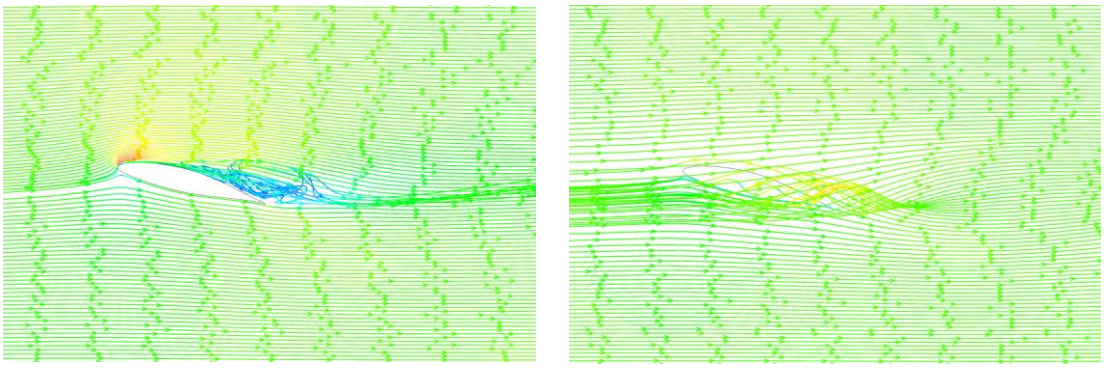
Figure 9 shows the results of the velocity magnitude contour at an angle of attack $\alpha = 14^o$ seen from the wingtip side in all research configurations. Figure 8 complements the visualization in Figure 8 regarding the conditions in the wingtip area, especially the characteristics of the vortex formed. This is natural because each configuration is not equipped with high-lift devices and is solely influenced by the shape of the wing.

Figure 9 also shows that the fluid flow jump from the lower surface to the upper surface of the wing is visible from the side. In the plain wing, the tip vortex is seen to start forming on the side of the leading edge which then develops towards the trailing edge. This development becomes more significant because it is supported by the length of the wingtip side, which in this case is the chordline. This causes the tip vortex to be larger in the area behind the trailing edge.

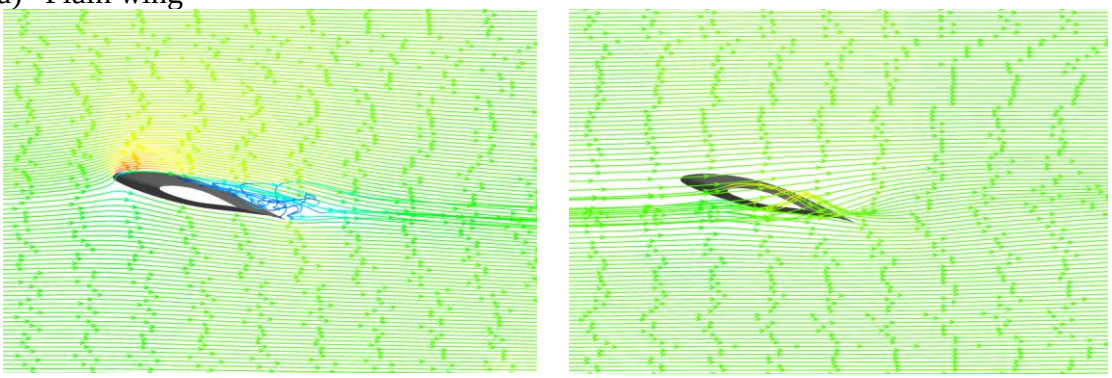
In the elliptical wing configuration, the tip vortex formed is smaller when compared to the plain wing configuration. This is supported by the chordline length on the wingtip side which is shorter than the plain wing configuration so that the formation of tip vortex can be suppressed. The same thing happens with the Schuemann wing configuration but because the chordline length is longer than the elliptical wing, the resulting vortex becomes slightly wider.

Another interesting thing to note is the confluence of the flow from the upper surface and lower surface in the area just in front of the trailing edge. The intensity that occurs in the plain wing, elliptical wing, and Schuemann wing is very different. In the plain wing, the vorticity formed has a large and irregular intensity due to the meeting between the flow from the lower surface meeting the flow from the main flow and also the vorticity and cross-flow coming from the midspan side. Traces of vorticity and cross-flow originating from the direction of the midspan side can be seen from Figure 6 which results in the characteristics of the meeting of these three flows in an irregular shape.

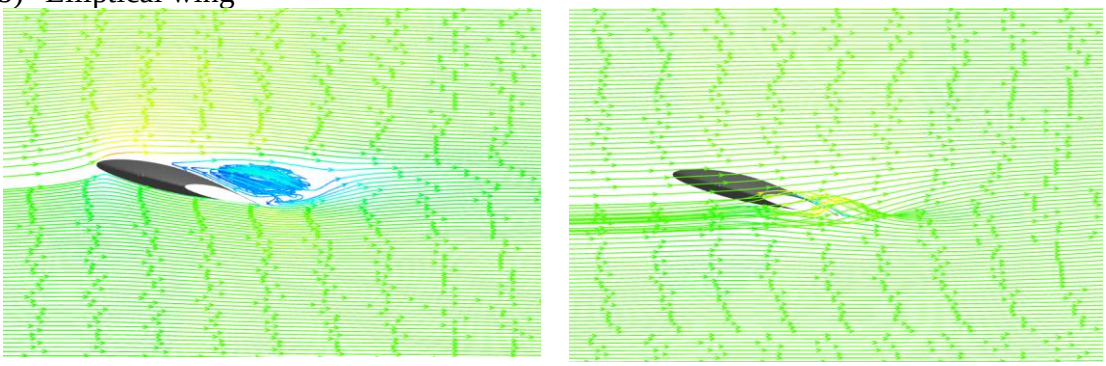
This is different from what happens to the elliptical wing whose trailing edge shape has a curved side. This causes vorticity and cross-flow from the midspan direction to not be so large in formation. In the Schuemann wing configuration, the parallel trailing edge shape produces a flow meeting intensity similar to the plain wing but has a more regular structure.



a) Plain wing



b) Elliptical wing



c) Schuemann wing

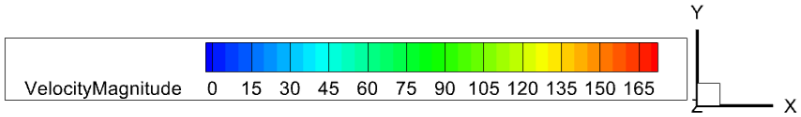



Figure 9. Velocity Magnitude Contour at α = 14°

## Conclusion

Numerical simulations have been carried out on all the study configurations resulting in several important points. The shape of the leading edge of the wing affects the occurrence of vorticity in the area behind it up to the trailing edge because the flow and vorticity develope along the upper surface. Straight and curved leading edge shapes will affect the size and speed of vorticity development. This can be seen from the skin friction magnitude contour along the upper surface.

In the area close to the wingroot, the development of vorticity is greater due to the influence of three-dimensional flow due to the interaction of the main flow and the wall of the wing which is often referred to as the fuselage. This causes the cross flow to move towards the midspan and even shift to influence each other towards the wingtip. On the wingtip side, the vorticity and cross-flow phenomena are displaced by the occurrence of the tip vortex phenomenon, which is a jump in fluid flow from the lower surface to the upper surface.

This fluid flow jump is not right at the top but shifts back from the upper surface. This causes a circular motion that causes a mark on the upper surface. This trace extends

to the trailing edge and continues to move around behind it to produce a vortex. The vortex generated behind the wingtip is larger than in other areas.

This phenomenon was performed under cruising conditions and can be extended to other conditions such as take-off and landing. Other movements are also very interesting to observe such as yawing or rolling conditions that cause vorticity and aerodynamic performance to be very dynamic. The addition of high-lift devices should also be considered to improve aerodynamic performance and minimize the occurrence of vorticity on the upper surface.

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# INVESTIGATION OF FLUID FLOW ACROSS A NACA 43018 WING AIRFOIL WITH THE ADDITION OF A TRAPEZOIDAL VORTEX GENERATOR IN A COUNTER-ROTATING ARRANGEMENT

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**Abstract:** Various changes and modifications to aircraft wings, including the use of high-lift devices, are technological advances in the aviation industry. Separation and stall can occur due to separation flow separation in the flow section attached to the wing. Using the oil flow visualization method, the characteristics of fluid flow across a trapezoidal-type vortex generator can be shown. However, with the advancement of technology, the 3D flow can be reconstructed and visualized more clearly including with ImageJ software. The purpose of this study is to visually see the characteristics of fluid flow across the NACA 43018 airfoil with different vortex generator positions and angle of attack (α). The vortex generator profile is placed at x/c = 20% of the leading-edge using flow velocities of 10 and 20 m/s at angles of attack α = 0°, 6°, 12°, and 17°. This study shows that three-dimensional flow reconstruction can be done with ImageJ application especially the interaction of trapezoidal vortex generator and freestream from the leading-edge direction and in the trailing edge region.

**Keywords:** oil flow visualization, vortex generator, trapezoidal, ImageJ, NACA 43018

## Introduction

An aircraft wing consists of several components that are connected to the fuselage. An airfoil is a component that forms the outline or basic shape of an aircraft wing and is specifically designed to generate the lift required for aircraft flight. In addition, wings also play an important role in controlling the stability, maneuverability, and aerodynamics of an aircraft. One method used to improve wing performance is to install a trapezoidal vortex generator. A trapezoidal vortex generator is an additional device installed on the surface of the wing to regulate airflow on the upper surface of the wing. Using a trapezoidal vortex generator has proven effective in reducing the formation of turbulence around the airfoil, increasing lift, and reducing drag. However, the effect of installing a trapezoidal vortex generator on a NACA 43018 airfoil in a counter-rotating configuration and its impact on airflow requires further investigation.

The oil flow visualization technique is a technique used to understand fluid flow patterns around an object, in this case a wing. By injecting a dye or dye material into the airflow, the dye's movement can be used to visualize the airflow around the airfoil. This method allows for a better understanding of how the trapezoidal vortex generator affects the airflow around the wing.

Experts who have researched using experiments in the laboratory using wind tunnels include Dharmawan et al. (Dharmawan et al., 2023), Wahyu et al. (Wahyu et al., 2023), and Mominul Islam Mukut et al. (Mominul Islam Mukut et al., 2012). In addition, experts have also researched using numerical simulations or Computational Fluid Dynamic including (W. Putra et

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al. (W. Putra et al., 2023), V. S. Putra et al. (V. S. Putra et al., 2023), Nuranto et al. (Nuranto et al., 2023), Herdiana (Herdiana, 2020), Ramadanny et al. (Ramadanny et al., 2022), (Romadhon and Herdiana,(Romadhon & Herdiana, 2017), Dai and Zhang (Dai & Zhang, 2023). In addition, the use of vortex generators has been extended to the field of heat transfer as has been researched by Shlash and Koç (Shlash & Koç, 2022), Syaiful et al. (Syaiful et al., 2017), Chai and Tassou (Chai & Tassou, 2018), Al-Dulaimi et al. (Al-Dulaimi et al., 2022), Prabowo et al. (Prabowo et al., 2021), Wang et al. (Wang et al., 2023), Si et al. (Si et al., 2024), Zhao et al. (Zhao et al., 2021), Rai and Singh (Rai & Singh, 2022), Marausna et al. (Marausna et al., 2023), and Nabhani et al. (Nabhani et al., 2020).

Verdhiana Sembodo Putra et al. (V. S. Putra et al., 2023) examined the use of rectangle vortex generators on sweptback wing airfoil NACA 0012 using a counter-rotating position. This numerical simulation research uses several angles of attack at a freestream velocity of 20 m/s. The use of a vortex generator can delay the stall that occurs at $\alpha = 14^o$ in plain wing. The most optimal use of vortex generator placement is 15% of the leading edge is the stall delay until it reaches $\alpha = 18^o$.

Wahyu Putra et al. (W. Putra et al., 2023) examined the use of triangular vortex generators on Sweptback Wing Airfoil NACA 23018. Numerical simulations were used at the position of the vortex generator 10% and 15% of the leading edge with a swept back angle of $15^o$. The use of x/c = 15% position further improves the aerodynamic performance and delays the occurrence of stall. Optimal aerodynamic performance occurs at an angle of attack $\alpha = 12^o$.

Zidhane Aliffaputra Nuranto et al. (Nuranto et al., 2023) examined the use of a gothic vortex generator with a straight position on a NACA 2412 airfoil wing. Numerical simulations using vortex generators positioned at a 10% and 15% of the leading edge with several angles of attack. The use of gothic vortex generators can delay the stall at $\alpha = 15^o$ in plain wing to $\alpha = 19^o$ with the optimal position x/c = 15%.

This study investigates the effect of mounting a trapezoidal vortex generator on a NACA 43018 airfoil in a counter-rotating configuration and uses oil flow visualization techniques to understand the changes that occur in the airflow. A deeper understanding of the interaction between the trapezoidal vortex generator, airfoil profile, and airflow is expected to contribute positively to the development of more efficient wing designs in aerospace and aerodynamic applications.

## Methods

In general, oil flow visualization will provide information that there is a change in the oil mixture above the airfoil if there is flow separation and fluid flow jumps. In the mid-span area, laminar flow is characterized by a thin pigment density. This is because the flow velocity reaches the maximum price at the shoulder of the airfoil and has a negative pressure gradient so that it sweeps away almost all the oil mixture pigments. Laminar separation bubble (transition) conditions are areas that begin to experience an increase in pressure followed by a decrease in fluid velocity after laminar flow conditions, characterized by a high density of oil mixture pigments. Behind the separation point, turbulent flow occurs where some of the fluid undergoes backflow and has a low pressure followed by an increase in speed characterized by the sweeping of the oil mixture. In general, at different angles of attack, when the angle of attack increases, it will be followed by a change in the separation point that advances closer to the leading edge (Demir et al., 2016; Genç, Özden, et al., 2016; Genç, Özkan, et al., 2016).

The oil film on the surface of the model allows for quick and easy capture of the flow pattern on the surface of the model placed in the wind tunnel (Hariyadi, 2019). Special mixtures can be prepared using specific oils and fine pigments, for example $Al_2O_3$; $TiO_2$, powders, fluorescent dyes, coloring pigments, and graphite. This technique allows the observation of separation lines and reattachment of the flow to the model body.

Oil flow visualization in principle displays the pathline structure of the near-wall flow which is identical to the structure of shear stress lines located on the wall surface. By the thoughts of Tobak and Peak (Tobak & Peake, 1982), the phenomenon of three-dimensional flow separation can be explained through the analysis of shear stress lines. The visualization technique is carried out with steps such as Sutrisno's research (Sutrisno, 2017), namely by making a mixture of Palm Oil and Titanium Oxide ($TiO_2$) powder with a volume ratio of 5: 1.

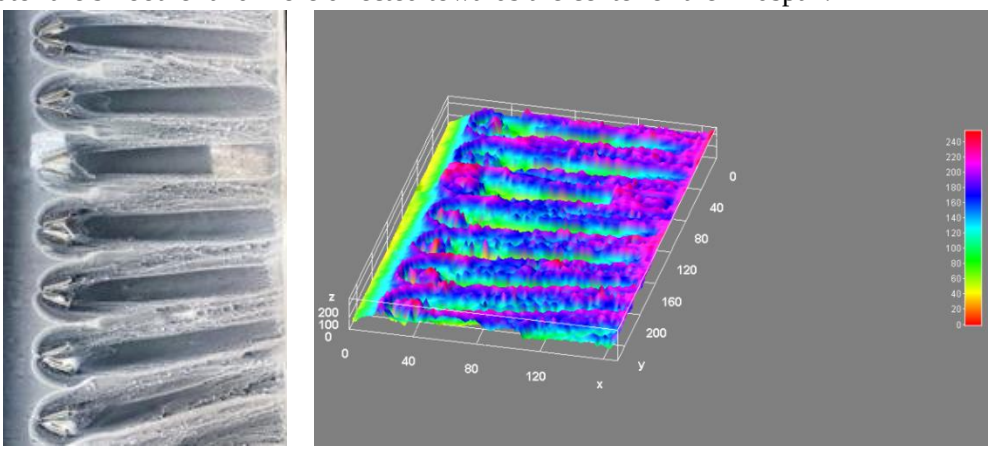
The results of this oil flow visualization have been discussed by Krisdiana (Krisdiana, 2024) by comparing a plain wing and the addition of a trapezoidal vortex generator configuration with a counter-rotating arrangement. The results of the oil flow visualization were analyzed using the ImageJ application to obtain an overview and simulation of fluid flow movement on the upper surface of the NACA 43018 wing. These results will be clarified by using three-dimensional surface reconstruction and visualization using the ImageJ application to display the actual flow interaction between the fluid flow and the vortex generator on the upper surface of NACA 43018.

**Three-Dimensional Contour Surface Plot of Isoline at v = 10 m/s**

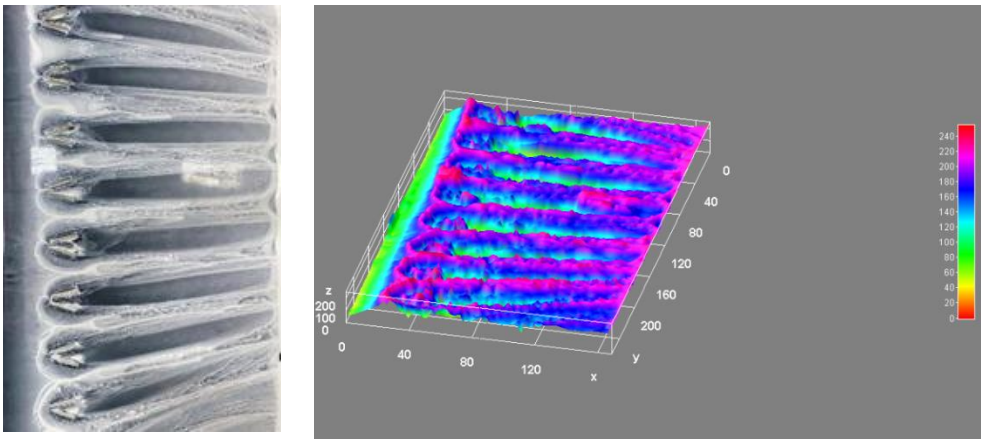
The isoline results in Figure 1 show the area formed due to fluid flow movement before and after interacting with the vortex generator. When the flow interacts with the vortex generator, the airflow velocity appears to be accelerating. After the interaction, the airflow velocity decreases. This is true for all research models. However, there are differences in the pattern of the angle of attack $\alpha = 0^o$, $6^o$, $12^o$, and $17^o$. Especially in the flow density before and after touching the vortex generator.

At angles of attack $\alpha = 0^o$ and $6^o$, the flow density before touching the vortex generator looks still smooth and does not produce a tight trace. Similarly, after touching the vortex generator, the flow development tends to stretch until it reaches the trailing edge of the wing. The smooth flow density before touching the vortex generator is the influence of the contour of the NACA 43018 wing which can still be passed well so that there is no stagnation pressure that causes flow gathering so that the flow tends to be obstructed.

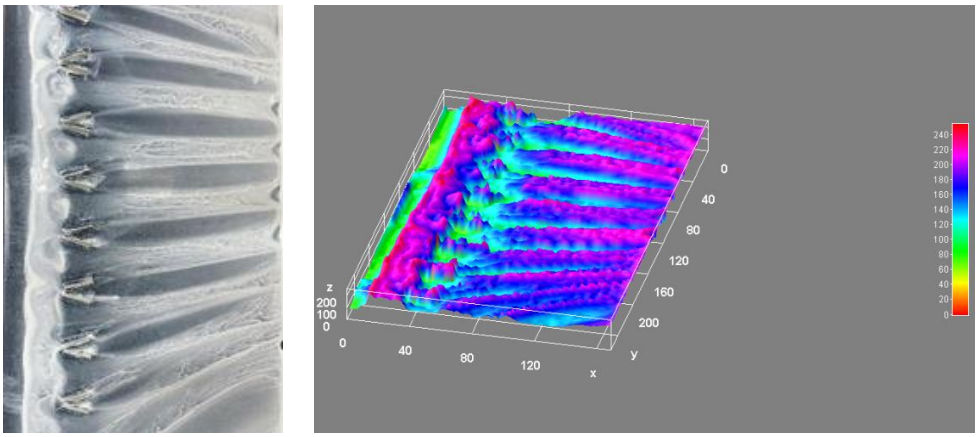
At angles of attack $\alpha = 12^o$ and $17^o$, the flow density before touching the vortex generator looks coarser produces a tight trace and leads to the midspan side. Again, this is the influence of the leading-edge contour of the NACA 43018 wing, which creates a rather high-pressure value so that the flow traces look thicker. However, the flow traces after interacting with the vortex generator are smoother and more directed towards the center of the midspan.



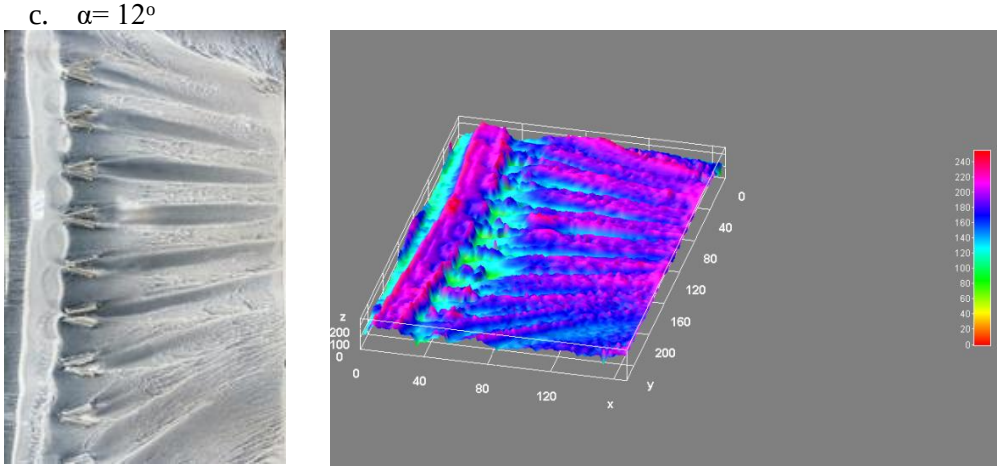

a. $\alpha = 0^o$



b. α= 6º



c. α= 12º

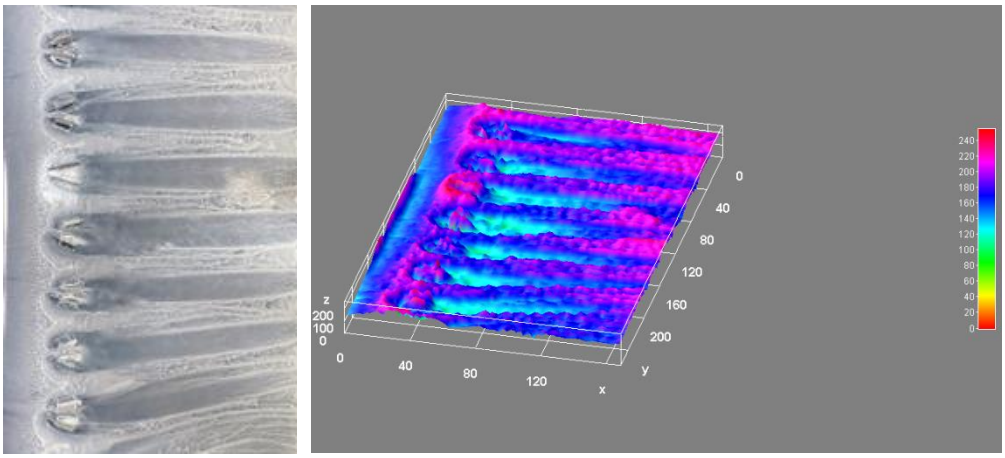


d. α= 17º

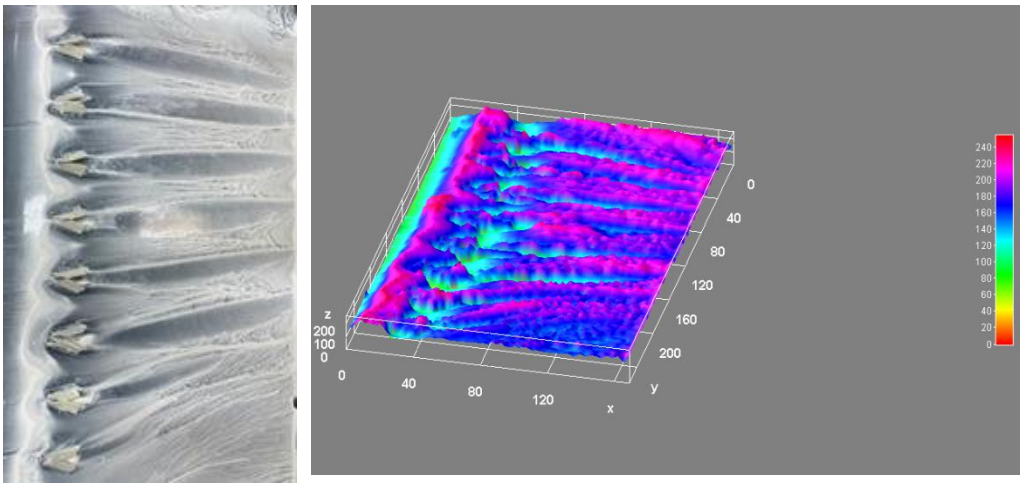
Figure 1. Visualization of three-dimensional contour surface plot of isoline at v = 10 m/s

**Three-Dimensional Contour Surface Plot of Isoline at v = 20 m/s**

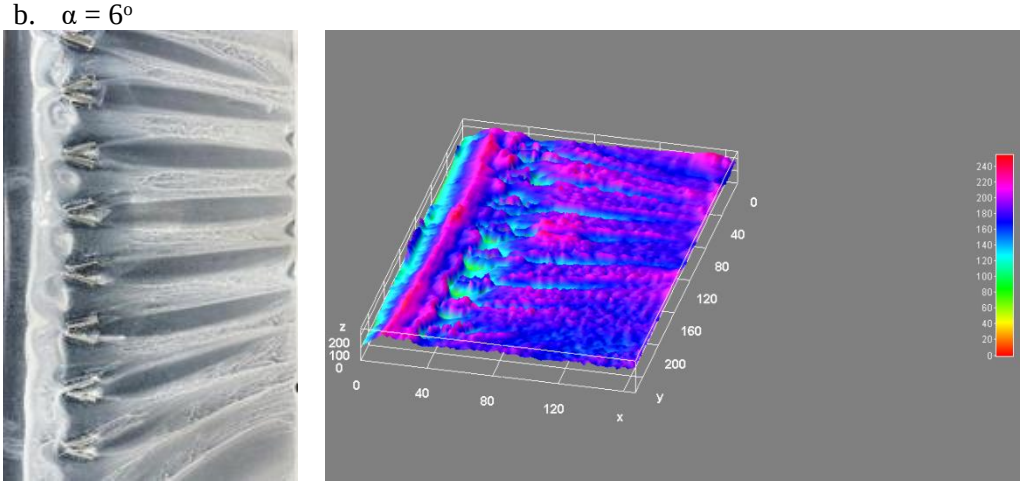
Figure 2 shows the flow reconstruction on the use of a vortex generator with the counter rotating arrangement on the NACA 43018 wing at v = 20 m/s. At angles of attack α = 0º, 6º, 12º, and 17º, the flow phenomenon shows the same state as Figure 1 but has a finer density and the flow direction to the midspan is tighter. At the angle of attack α = 17º, it can be seen that some areas in the midspan region have begun to be erased, indicating the separation of the flow that has begun to move towards the leading edge.



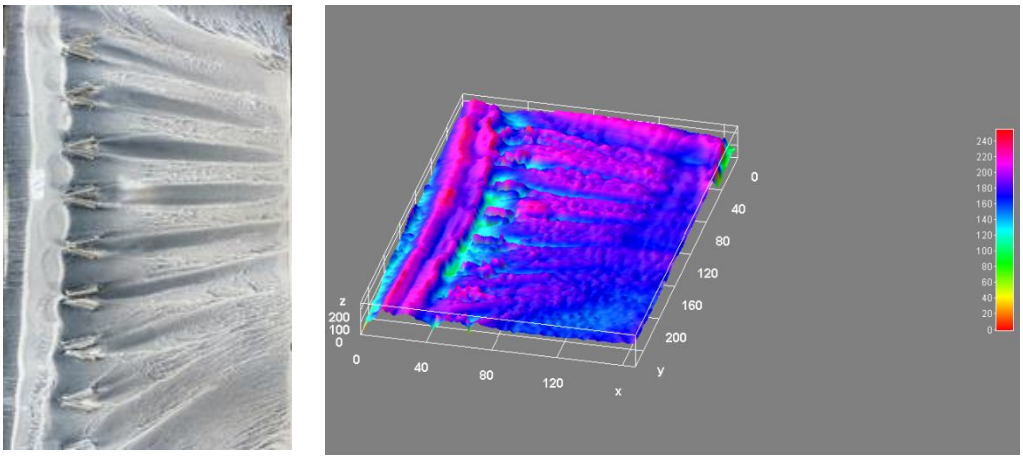

a. $\alpha = 0^o$




b. $\alpha = 6^o$




c. $\alpha = 12^o$



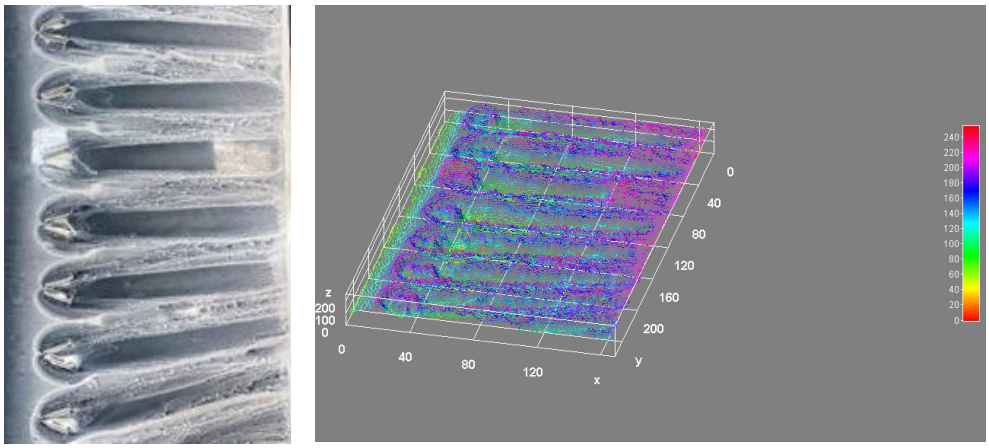

d. $\alpha = 17^{o}$

Figure 2. Visualization of three-dimensional contour surface plot of isoline at v = 20 m/s

**Visualization of Three-Dimensional Contour Surface Plot Pathline at v = 10 m/s**

In the streamline model, it can be seen that the flow direction at the time of the interaction of the flow with the vortex generator arises. This circulation area develops towards the back of the vortex generator at a decreasing velocity. This can be seen from the color contours in the area around the vortex generator which is higher than the area behind it and the area further away from the interaction area between the flow and the vortex generator.

At angles of attack $\alpha = 12^{o}$ and $17^{o}$, it can be seen that the flow interaction behind the vortex generator actually shows a lower value while the area around the trailing edge shows a higher value. This is due to the reattachment mechanism of the flow after meeting the vortex generator. In the reattachment area, the interaction between the flow and the upper surface of the NACA 43018 wing produces a higher value. The mechanism is seen in all vortex generators but is reduced in vortex generators in the edge area.




$\alpha = 0^{o}$

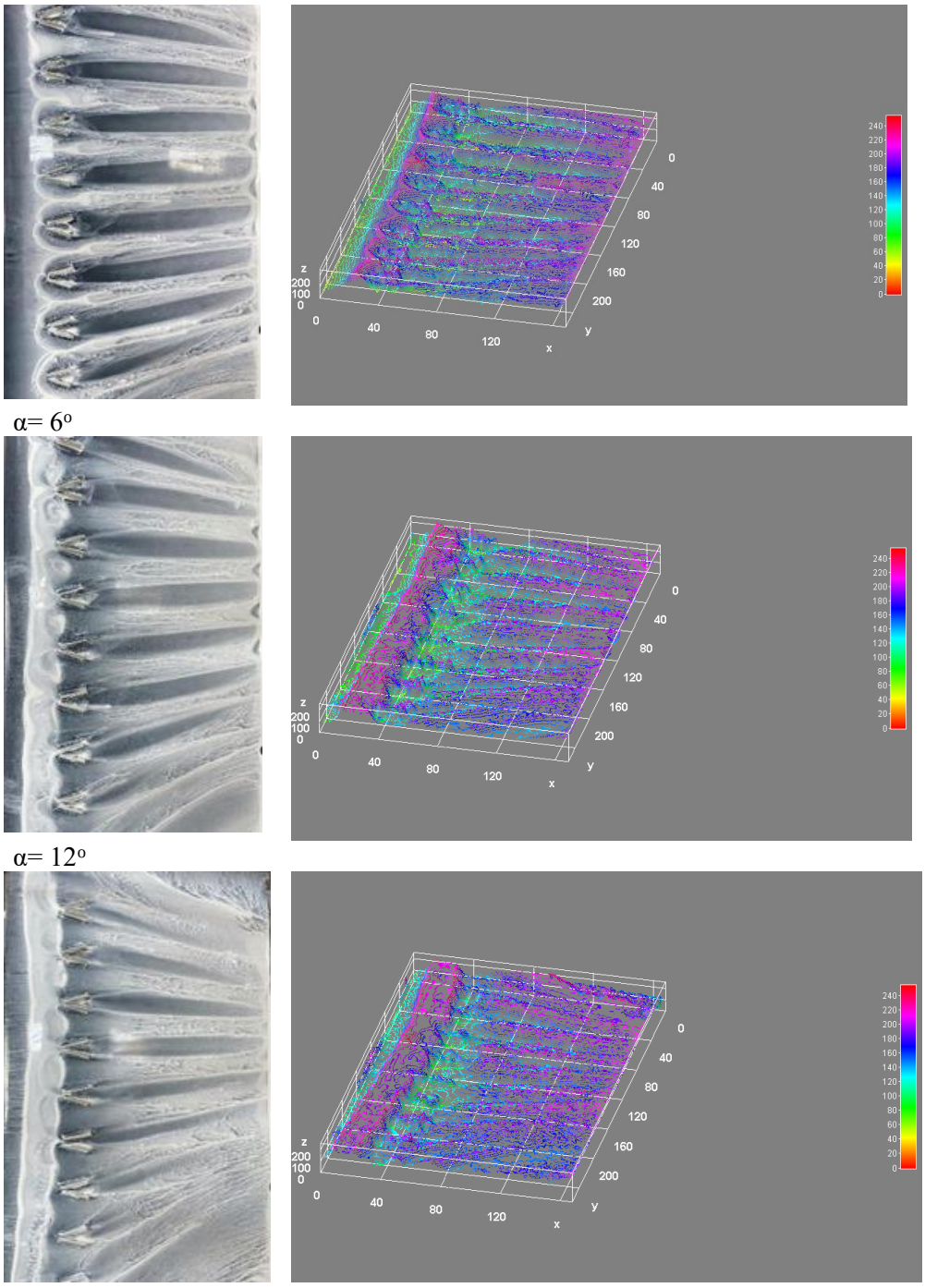
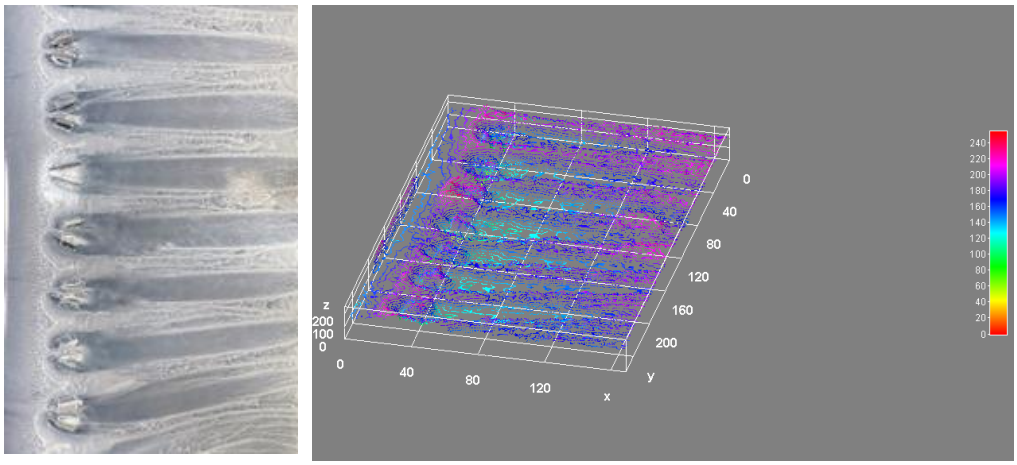


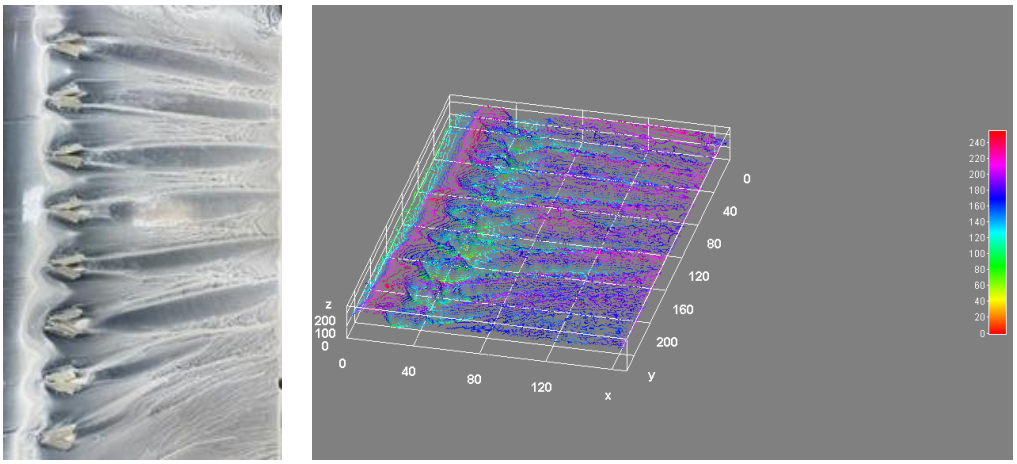

Figure 3. Visualization of three-dimensional contour surface plot pathline at v = 10 m/s

**Visualization of Three-Dimensional Contour Surface Plot Pathline at v = 20 m/s**

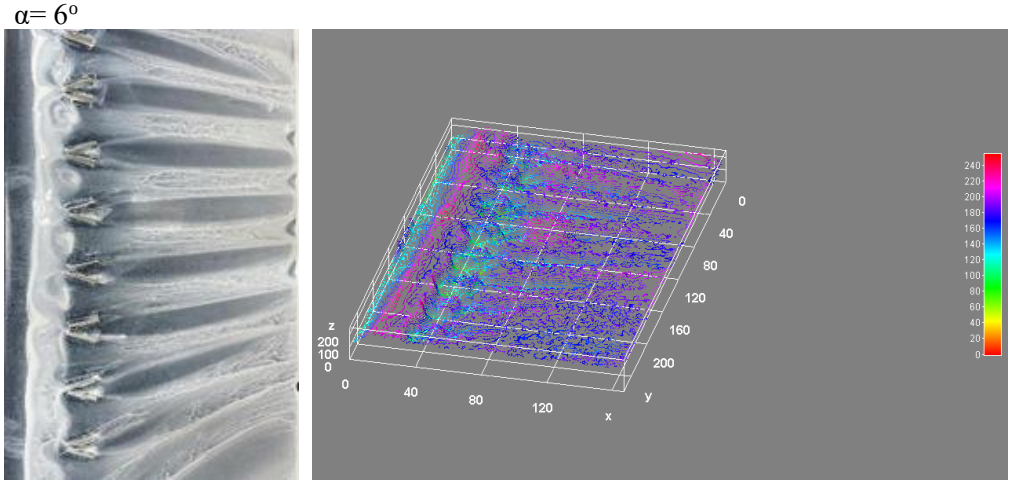
Figure 4 shows the three-dimensional contour visualization of the pathline at v = 20 m/s. The figure shows that the mechanism is almost the same as v = 10 m/s. Figure 4 shows that the reattachment length has a shorter value than v = 10 m/s. With a higher velocity, the reattachment becomes shorter which will eventually lead to delayed separation and stall.


z
200
100
0
0
40
80
120
x
0
40
80
120
160
200
y
240
220
200
180
160
140
120
100
80
60
40
20
0

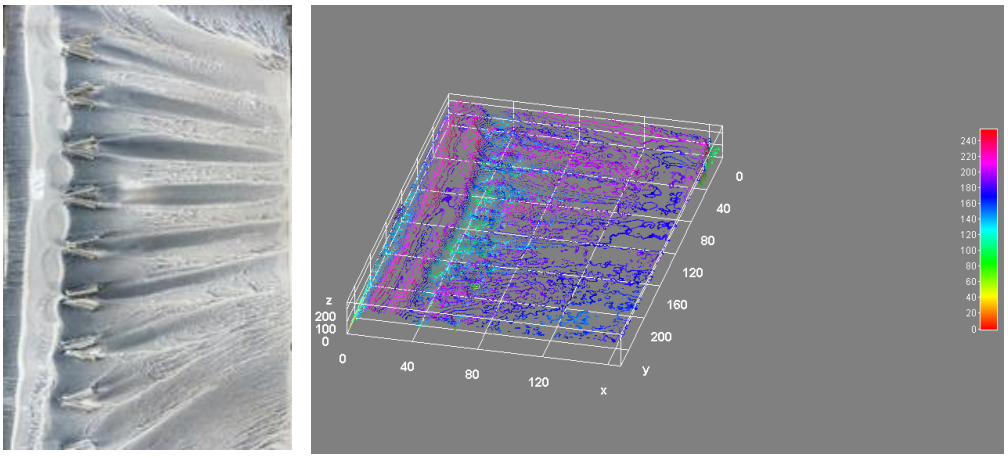
α= 0º


z
200
100
0
0
40
80
120
x
0
40
80
120
160
200
y
240
220
200
180
160
140
120
100
80
60
40
20
0

α= 6º


z
200
100
0
0
40
80
120
x
0
40
80
120
160
200
y
240
220
200
180
160
140
120
100
80
60
40
20
0

α= 12º




α= 17º

Figure 4. Visualization of three-dimensional contour surface plot of isoline at v = 20 m/s

## Conclusion

From the analysis of experimental results on NACA 43018 airfoil using oil flow visualization on the upper surface with the addition of vortex generator and three-dimensional surface reconstruction and visualization using ImageJ, the following conclusions can be drawn:

1. The installation of a trapezoidal vortex generator on the airfoil can increase fluid momentum to counteract the adverse pressure gradient and surface shear stress to delay the occurrence of separation at all observed angles of attack.
2. The effect of velocity on the use of trapezoidal vortex generators is able to shorten the distance between the vortex and the reattachment point compared to lower velocities.
3. A trapezoidal vortex generator is effectively used at a angle of attack α = 0 - 17° with velocities of 10 and 20 m/s.
4. The use of the ImageJ application can reconstruct and visualize three-dimensional flow on the surface area of the NACA 43018 wing.

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KEMENTERIAN PERHUBUNGAN

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| | | **c. RAMBUT** | : | LURUS |
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| 15 | TCC DVOR | 09-05-2011<br>21-07-2011 | 2011 | STPI CURUG | SERTIFIKAT |
| 16 | RECURRENT CESSNA 172 SERIES MAINTENANCE TYPE RATING COURSE | 03-08-2010<br>06-08-2010 | 2010 | MERPATI PILOT SCHOOL | SERTIFIKAT |
| 17 | HUMAN FACTOR IN AVIATION MAINTENANCE | 06-09-2010<br>08-09-2010 | 2004 | PLP CURUG TRAINING C | SERTIFIKAT |
| 18 | GENERAL INSTRUCTURE COURSE | 27-01-2003<br>28-02-2003 | 2003 | STPI CURUG | SERTIFIKAT |
| 19 | BASIC AIRCRAFT MAINTENANCE COURSE | 06-10-1998<br>11-12-1998 | 1998 | PLP CURUG | SERTIFIKAT |
| 20 | KURSUS DASAR TEKNIK | 03-08-1998<br>23-10-1998 | 1998 | PLP CURUG | SERTIFIKAT |

**2.a. Diklat jabatan / penjenjangan**

| NO | NAMA DIKLAT | DARI | SAMPAI | TEMPAT | KETERANGAN |
|---|---|---|---|---|---|
| 1 | PIM TINGKAT III | 17-02-2020 | 12-06-2020 | PPSDMAP BOGOR | LULUS |
| 2 | PIM TINGKAT IV | 07-04-2014 | 03-07-2014 | BOGOR | LULUS |

**III. RIWAYAT PEKERJAAN**

**1. Riwayat kepangkatan golongan ruang penggajian**

| NO | PANGKAT | GOL | TMT | GAJI POKOK | SURAT KEPUTUSAN | | PERATURAN |
|---|---|---|---|---|---|---|---|
| | | | | | PEJABAT | NOMOR DAN TANGGAL | |
| 1 | PEMBINA | IV/a | 01-04-2021 | 4.151.100,00 | MENTERI PER HUBUNGAN | SK 1544 Tahun 2021 27-07-2021 | |
| 2 | PENATA TINGKAT I | III/d | 01-04-2018 | 3.667.300,00 | MENTERI PER HUBUNGAN | SK.42/BPSDMP/PHB-2018 20-04-2018 | MENTERI PERHUBUNGAN |
| 3 | PENATA | III/c | 01-04-2014 | 3.128.200,00 | MENTERI PER HUBUNGAN | SK.336/PHB-2014 21-07-2014 | MENTERI PERHUBUNGAN |
| 4 | PENATA MUDA TINGKAT I | III/b | 01-04-2008 | 1.647.700,00 | MENHUB | SK.391/KP.302/Dik-08 25-04-2008 | MENHUB |
| 5 | PENATA MUDA | III/a | 01-04-2004 | 946.500,00 | MENHUB | SK.266/KP.302/DIKLAT-04 04-05-2004 | MENHUB |
| 6 | PENGATUR | II/c | 01-10-2001 | 708.700,00 | KABADAN DIKLAT | SK.54/KP.302/DIKLAT-2002 17-01-2002 | KABADAN DIKLAT |
| 7 | PENGATUR MUDA TINGKAT I | II/b | 01-03-1999 | 208.400,00 | KABADAN DIKLAT | SK.45/KP.301/DIKLAT-1999 25-02-1999 | KABADAN DIKLAT |
| 8 | PENGATUR MUDA TINGKAT I | II/b | 01-03-1998 | 163.840,00 | DIRJEN PHB UDARA | SKEP/371/VI/PEG/98 17-06-1998 | DIRJEN PHB UDARA |

**2. Pengalaman jabatan / pekerjaan**

| NO | PENGALAMAN PEKERJAAN | MULAI DAN SAMPAI | GOL | GAJI POKOK | SURAT KEPUTUSAN | | TANGGAL |
|---|---|---|---|---|---|---|---|
| | | | | | PEJABAT | NOMOR | |
| 1 | KEPALA BAGIAN ADMINISTRASI AKADEMIK DAN KETARUNAAN | 13-12-2019 | | 1.260.000,00 | MENTERI PER HUBUNGAN | SK. 2483 TAHUN 2019 | 12-12-2019 |
| 2 | KEPALA SUBBAGIAN ADMINISTRASI AKADEMIK | 10-01-2019<br>13-12-2019 | III/d | 0,00 | MENTERI PER HUBUNGAN | SK. 42 TAHUN 2019 | 09-01-2019 |
| 3 | KEPALA SEKSI SARANA DAN PRASARANA DIKLAT, BP3 BANYUWANGI | 21-07-2017<br>09-01-2019 | III/d | 490.000,00 | MENTERI PER HUBUNGAN | SK.718 TAHUN 2017 | 20-07-2017 |
| 4 | KEPALA SEKSI PENYELENGGARAAN & KERJASAMA DIKLAT BALAI PENDIDIKAN & PELATIHAN PENERBANG BANYUWANGI | 10-12-2015<br>20-07-2017 | III/c | 490.000,00 | MENTERI PER HUBUNGAN | SK. 2073 TAHUN 2015 | 08-12-2015 |
| 5 | KEPALA SUBBIDANG SARANA PUSBANG SDM APARATUR PERHUBUNGAN | 03-07-2014<br>10-12-2015 | III/c | 540.000,00 | MENTERI PER HUBUNGAN | SK.582 TAHUN 2014 | 01-07-2014 |
| 6 | LEKTOR - DOSEN | 22-12-2013<br>01-07-2014 | III/b | 0,00 | KEMENTERIAN PERHUBUNGAN | SK.660 TAHUN 2013 | 23-12-2013 |
| 7 | KEPALA UNIT BIMBINGAN TARUNA | 02-01-2013<br>03-07-2014 | III/b | 0,00 | KETUA STPI | PRINT/03/KP.004/STPI-2013 | 02-01-2013 |
| 8 | KEPALA URUSAN HUBUNGAN MASYARAKAT | 20-01-2012<br>31-12-2012 | III/b | 0,00 | KA. SEKOLAH TINGGI PENERBANGAN INDONESIA | PRINT/34/KP.004/STPI-2012 | 20-01-2012 |
| 9 | DOSEN STPI /ASISTEN AHLI | 28-12-2010<br>22-12-2013 | III/b | 0,00 | KEMENTERIAN PERHUBUNGAN | SK.1519/2010 | 28-12-2010 |
| 10 | TEKNISI BENGKEL PESUD | 04-03-2002 | II/c | 946.500,00 | KEPALA BADAN DIKLAT | SK.266/KP.302/DIKLAT-04 | 04-05-2004 |
| 11 | TEKNISI BENGKEL PESUD | 01-03-1999 | II/b | 208.400,00 | KA. PLP | PRINT/233//III/PLP-99 | 24-03-1999 |
| 12 | INSTRUKTUR | 02-01-1998<br>27-12-2010 | II/b | 0,00 | KEPALA PLP CURUG | | |

**IV. TANDA JASA / PENGHARGAAN**

| NO | NAMA BINTANG / SATYA LENCANA / PENGHARGAAN | TAHUN | NAMA NEGARA / INSTANSI / YANG MEMBERI |
|---|---|---|---|
| 1 | SATYA LANCANA KARYA SATYA 20 TAHUN | 2018 | INDONESIA |

## V. PENELITIAN

| PENGALAMAN PENELITIAN | | | |
|---|---|---|---|
| **Tahun** | **Judul Penelitian** | **Ketua/Anggota Tim** | **Luaran** |
| 2010 | Analisa Pemasangan Doubler Antenna pada fuselage Pesawat Boeing 737-300 Menggunakan Metode Elemen Hingga | Ketua | JURNAL ISBN LANGIT BIRU STPI-CURUG |
| 2021 | Characteristics of Sparation of induced Drag in the Use of Swept-back Wing Unmanned Aerial Vehicle | anggota | ICATECH 2021 Journal of Physics: Conference Series |

**VIII. KETERANGAN LAIN - LAIN**

| NO | NAMA KETERANGAN | SURAT KETERANGAN | | TANGGAL |
|---|---|---|---|---|
| | | PEJABAT | NOMOR | |
| 1. | KETERANGAN BERPERILAKU BAIK | - | - | - |
| 2. | KETERANGAN BERBADAN SEHAT | - | - | - |
| 3. KETERANGAN LAIN YANG DIANGGAP PERLU | | | | |

Demikian daftar riwayat hidup ini saya buat dengan sesungguhnya dan apabila di kemudian hari terdapat keterangan yang tidak benar saya bersedia dituntut dimuka pengadilan serta bersedia menerima segala tindakan yang diambil oleh pemerintah.

.....
Yang Membuat,

SUKAHIR, S.Si.T., M.T.
NIP. 19740714 199803 1 001

PERHATIAN :
1. Harus ditulis dengan tangan sendiri menggunakan huruf kapital / balok dan tinta hitam
2. Jika ada yang salah harus dicoret, yang dicoret tersebut tetap terbaca kemudian yang benar dituliskan di atas atau di bawahnya dan diparaf.
3. Kolom yang kosong diberi tanda

Dicetak Oleh :
SUKAHIR, S.Si.T., M.T.
19740714 199803 1 001

## CURRICULUM VITAE

### A. Personal Identity:

1. Name : Ir. **Asep Muhamad Soleh, S.SiT, S.T, M.Pd.**
2. Academic Position : Dosen-Lektor
3. Scopus Author Id 57211434008
   https://www.scopus.com/authid/detail.uri?authorId=57211434008
4. Google Scholar Id :
   https://scholar.google.co.id/citations?user=Xi84MIIAAAAJ&hl=id&oi=ao
5. Orcid Id : 0000-0001-6422-3340
   https://orcid.org/0000-0001-6422-3340
6. Sinta Id 6741624
7. Researchgate : https://www.researchgate.net/profile/Asep_Soleh2
8. Date/Place of Birth : Bandung, 21-06-1975
9. Address : Komplek Griya Hero Abadi Blok AB.20 Palembang, Indonesia
10. Living Address : Citra Grand City, Tropical Valley, Blok SA8-03 Palembang
11. Phone : +62811150204
12. Affiliation : Politeknik Penerbangan Palembang
13. Email : 1. azepms@gmail.com,
    2. asep_muhamad@dephub.go.id,
    3. asep@poltekbangplg.ac.id,

### B. Educational Background:

| | | | |
|---|---|---|---|
| 1. | Primary School | : SD Negeri Bbk Sari II Bandung | 1983 - 1988 |
| 2. | Secondary School | : SMP Negeri 14 Bandung | 1988 - 1991 |
| 3. | High School | : SMA Negeri 8 Bandung | 1991 - 1994 |
| 4. | Undergraduate | : STPI | 2003 - 2003 |
| 5. | Master Graduate | : Magister Pendidikan Universitas PGRI Palembang | 2017 - 2019 |
| 6. | Doctoral Graduate | : - | |

### C. Work Experience:

| | | |
|---|---|---|
| 1. | Lecturer Airport Engineering Technology, Poltekbang Palembang | 2006 - Now |
| 2. | Instructor Aviation Safety | 2006 - Now |
| 3. | Kasubag Administrasi Ketarunaan dan Alumni | 2019 - 2021 |
| 4. | Lecturer in Sekolah Tinggi Penerbangan Indonesia | 1998 - 2006 |
| 5. | Technician in Sekolah Tinggi Penerbangan Indonesia | 1998 - 2006 |
| 6. | Instructor in Sekolah Tinggi Penerbangan Indonesia | 1998 - 2006 |
| 7. | Kasi Sarana dan Prasarana | 2017 - 2019 |
| 8. | Kasubag Tata Usaha in Balai Diklat Penerbangan Palembang | 2013 - 2017 |

### D. Major Lecturing Experiences

1. Menggambar Teknik Listrik
2. Alat Ukur dan Pengukuran Listrik

3. Sistem Sistem Alat Bantu Pendaratan Visual
4. Mesin Listrik
5. Transmisi dan Distribusi Listrik
6. Metodologi Penelitian
7. UPS & Solar Cell
8. Operasi dan Pemeliharaan Fasilitas Teknik Bandar Udara
9. Basic Fire Pump For Aircraft Rescue Fire Fighting

## E. Research Field

1. Ilmu Pendidikan
2. Teknologi Rekayasa Bandar udara

## F. Publication

| No. | Journal | Title | ISBN/ISSN | Online |
|---|---|---|---|---|
| 1 | Proceeding Indexed on Google Scholar (Sinta 4) | Pengembangan Media Simulator pada Pendidikan dan Pelatihan Foam Tender Operation and Defensive Driving di Balai Pendidikan dan Pelatihan Penerbangan Palembang | Prosiding Seminar Nasional PPs UPGRI Palembang, 12 Januari 2019: Hal. 108-119. ISBN: 978-602-52451-2-1 | https://jurnal.univpgri-palembang.ac.id/index.php/Prosidingpps/article/view/2520, |
| 2 | International Journal Indexed on Scopus Q4 | Development Of The Practical Manual As A Learning Media For Simulator Aircraft Rescue And Fire Fighting | International Journal of Scientific & Technology Research Volume 8 - Issue 10, October 2019 Edition, ISSN 2277-8616 | http://www.ijstr.org/paper-references.php?ref=IJSTR-1019-23958 |
| 3 | International Journal Indexed on Google Scholar | Design Of High Gain Low Noise Amplifier At Base Station Receiver VOR Equipment For Ground Check Monitoring As Learning Media In Civil Aviation Academy | International Journal of Progressive Sciences and Technologies Vol 23 Issue 1 2020 ISSN:2509-0119 DOI : 10.52155 | https://scholar.google.co.id/scholar?oi=bibs&cluster=13049486252801050208&btnI=1&hl=id |
| 4 | Jurnal Nasional Sinta 3 | Kondisi Literasi Media Digital dalam Aktifitas Kerja Pegawai Politeknik Penerbangan Palembang | Jurnal Kajian Teori dan Praktik Kependidikan http://dx.doi.org/10.17977/um027v5i22020p051 | http://journal2.um.ac.id/index.php/jktpk/article/view/18610 |

| | | | | |
|---|---|---|---|---|
| 5 | Jurnal Nasional PkM | Pelatihan Safety Management System bagi Pegawai Unit Penyelenggara Bandar Udara Gusti Syamsir Alam Kotabaru | Darmabakti: Jurnal Inovasi Pengabdian Dalam Penerbangan 1 (1), 19-29 | http://e-journal.poltekbangplg.ac.id/index.php/darmabakti/article/view/9 |
| 6 | Jurnal Nasional Sinta 3 | Establishment of Discipline Character and Responsibility Through Parenting Patterns | JMKSP (Jurnal Manajemen, Kepemimpinan, dan Supervisi Pendidikan) 7 (1), 110-120 | https://jurnal.univpgri-palembang.ac.id/index.php/JMKSP/article/view/6780 |
| 7 | Buku | DAMPAK PANDEMI COVID-19 DALAM DUNIA PENERBANGAN | PENERBIT LEBAH BUKU GROUP Jogjakarta | http://repository.poltekbangplg.ac.id/id/eprint/38/ |
| 8 | Jurnal Nasional PkM | Pelatihan Teknologi Air Conditioning System Di Lingkungan Bandar Udara | Darmabakti: Jurnal Inovasi Pengabdian dalam Penerbangan 2 (2), 94-104 | http://e-journal.poltekbangplg.ac.id/index.php/darmabakti/article/view/57 |

# CURICULUM VITAE

## A. Identitas Diri



| | | | |
|---|---|---|---|
| 1. | Nama Lengkap (dengan gelar) | Dr.Ir. Setyo Hariyadi Suranto Putro, S.T., M.T., IPM | L/~~P~~ |
| 2. | Jabatan Fungsional | Dosen/Lektor Kepala/Assoc. Professor | |
| 3. | Jabatan Struktural | - | |
| 4. | NIP/NIK/No.Identitas lainnya | 19790824 200912 1001/3520142408790003 | |
| 5. | NIDN | 4224087901 | |
| | Nomor Registrasi Sertifikasi Pendidik | 16142400600952 | |
| | NIRA | 201614240060095219725 | |
| | NRA | 2023353 | |
| 6. | Tempat dan Tanggal Lahir | Purworejo/24 Agustus 1979 | |
| 7. | Alamat Rumah | Temboro RT 6 RW II Karas Magetan Kalijudan Taruna III/157C Mulyorejo Surabaya | |
| 8. | Nomor Telepon/Faks /HP | 08213935884 | |
| 9. | Alamat Kantor | Jemur Andayani I/73 Wonocolo Surabaya | |
| 10. | Nomor Telepon/Faks | 031-8410871 | |
| 11. | Alamat e-mail | hudzaifahsetyo@gmail.com, setyo_hariyadi@dephub.go.id setyo_hariyadi@poltekbangsby.ac.id | |
| 12. | Bidang Keahlian | Teknik Mesin | |
| 13. | Kompetensi | A1 : Airframe Airplane (Fixed Wing) | |
| | | A2 : Airframe Helicopter | |
| | | A3 : Piston Engine | |
| | | A4 : Turbine Engine | |
| | | C1 : Radio and Electronics | |
| | | C2 : Instrument | |
| | | C4 : Electrical | |
| | | CR1 : Composite Repair 1 | |
| | | CR2 : Composite Repair 2 | |
| | | CR3 : Composite Repair 3 | |
| | | NDT/NDI : Eddycurrent Testing Level II | |
| 14. | Mata Kuliah yang diampu | Fisika | |
| | | Teknologi Mekanik/Basic Workshop Theory | |
| | | Menggambar Teknik/Technical Drawing | |
| | | Mekanika Fluida | |
| | | Aerodinamika/Aerodynamic and Performance | |
| | | Electrical Fundamental | |
| | | Hydraulic Pneumatic /Sistem Mekanikal Pesawat Terbang/Aircraft Mechanical System | |

| | | |
|---|---|---|
| | | Airframe Structure |
| | | Menggambar CAD |
| | | Rekayasa Struktur |
| | | Mekanika Teknik |
| | | Material Pesawat Terbang/Aircraft Material |
| | | Aircraft Instrument |
| | | Aircraft Hardware |
| | | Wiring Integrated System |
| | | Cabin Environment System |
| | | Dasar Teknologi Informasi |
| | | General Aircraft Performance |
| | | Aircraft Maintenance and Repair |
| | | Propeller |
| | | Inspection Technic and Aircraft Handling |
| | | Aircraft Maintenance Procedure |
| | | Metodologi Penelitian |

**B. Riwayat Pendidikan**

| Program | S-1 | S-2 | S-3 |
|---|---|---|---|
| Nama Perguruan Tinggi | Institut Teknologi Sepuluh Nopember (ITS) Surabaya | Institut Teknologi Sepuluh Nopember (ITS) Surabaya | Institut Teknologi Sepuluh Nopember (ITS) Surabaya |
| Bidang Ilmu | Teknik Mesin/Manufaktur | Teknik Mesin/Konversi Energi/Aerodinamika | Teknik Mesin/Rekayasa Konversi Energi/ Aerodinamika |
| Tahun Masuk | 1997 | 2012 | 2016 |
| Tahun Lulus | 2004 | 2015 | 2019 |
| Judul Skripsi/Thesis /Disertasi | Perancangan Software Sistem Pakar Sebagai Alat Bantu Pengambil Keputusan untuk Pemakaian Mesin JSEDM CNC Seri 304N/60A | Studi Numerik dan Eksperimen Efek Variasi Posisi Vortex Generator Terhadap Boundary Layer Pada Airfoil NACA 43018 | Studi Aerodinamika Shifted Downstream Winglet Untuk Wing Airfoil Eppler 562 pada Unmanned Aerial Vehicle |
| Nama Pembimbing/Promotor | Ir. Sampurno, M.T. | Dr. Wawan Aries Widodo, S.T., M.T. | Prof. Ir. Sutardi, M.Eng., Ph.D.<br>Dr. Wawan Aries Widodo, S.T., M.T. |

**C. Pengalaman Penelitian dalam 5 Tahun Terakhir baik Nasional maupun Internasional**

(Bukan Skripsi, Tesis, maupun Disertasi)

| No. | Tahun | Judul Penelitian | Pendanaan | |
|---|---|---|---|---|
| | | | Sumber *) | Jml (Juta Rp.) |
| 1. | 2011 | Rancangan Modifikasi Sistem Kontrol Constant Current Regulator (CCR) TYPE NBF 1200 Menggunakan Programmable Logic Control (PLC) di Bandar Udara | DIPA ATKP Surabaya 2011 | |
| 2. | 2012 | Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan dan Computer Base Training Pada Lathe Machine di Laboratorium General | DIPA ATKP Surabaya 2012 | |

| No. | Tahun | Judul Penelitian | Pendanaan | |
|---|---|---|---|---|
| | | | Sumber *) | Jml (Juta Rp.) |
| | | Workshop Prodi Teknik Pesawat Udara Jurusan Teknik Penerbangan ATKP Surabaya | | |
| 3. | 2013 | Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan dan Computer Base Training Pada Trainer Cessna 172 di Laboratorium Teknik Pesawat Udara Jurusan Teknik Penerbangan ATKP Surabaya | DIPA ATKP Surabaya 2013 | |
| 4. | 2014 | Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan dan Computer Base Training Pada Piston Engine di Laboratorium Teknik Pesawat Udara Jurusan Teknik Penerbangan ATKP Surabaya | DIPA ATKP Surabaya 2014 | |
| 5. | 2015 | Studi Numerik Efek Variasi Posisi Vortex Generator Terhadap Boundary Layer Pada Airfoil NACA 43018 | Mandiri | |
| 6. | 2015 | Studi Numerik Efek Variasi Posisi Vortex Generator Terhadap Koefisien Lift dan Koefisien Drag Pada Airfoil NACA 43018 di Sayap Pesawat ATR 72 Seri 500/600 | Mandiri | |
| 7. | 2015 | Studi Numerik Efek Penggunaan Vortex Generator Terhadap Boundary Layer Airfoil NACA 23018 | Mandiri | |
| 8. | 2016 | Analisis Aerodinamika Penggunaan Wingtip Fence Pada Wing Airfoil NACA 43018 | Mandiri | |
| 9. | 2016 | Analisis Aerodinamika Perbandingan Vortex Generator Pada Wing Airfoil NACA 43018 Susunan Straight dan Counter Rotating (Studi Kasus Peletakan Vortex Generator x/c =10% dan 20%) | Mandiri | |
| 10 | 2016 | Rancang Bangun Modul Pembelajaran Aerodinamika Pada Wing Airfoil Cessna 421 Golden Eagle di Laboratorium Teknik Pesawat Udara Jurusan Teknik Penerbangan ATKP Surabaya | DIPA ATKP Surabaya 2016 | 10 Juta |
| 11 | 2017 | Analisis Aerodinamika Pada Wingtip Fence Cessna 172 di Laboratorium Teknik Pesawat Udara ATKP Surabaya | DIPA ATKP Surabaya 2017 | 10 Juta |
| 12 | 2018 | Studi Numerik dan Eksperimental Perbandingan Bentuk Vortex Generator dengan Posisi Straight pada Wing Airfoil NACA 43018 | DIPA Poltekbang Surabaya 2018 | 20 Juta |
| 13 | 2019 | Karakteristik Aliran Fluida Untuk Penggunaan Vortex Generator dengan Posisi Straight Pada Wing Airfoil NACA 0012 | DIPA Poltekbang Surabaya 2019 | 20 Juta |
| 14 | 2020 | Perbandingan Simple, Wingtip Fence, dan Blended Winglet Terhadap Performa Aerodinamika pada Wing Airfoil Eppler 562 | DIPA Poltekbang Surabaya 2020 | 20 Juta |
| 15 | 2021 | Stall Behaviour Beberapa Planform Wing dengan Reynolds Number Rendah pada Performa Aerodinamika Wing Airfoil Eppler 56 | DIPA Poltekbang Surabaya 2021 | 20 Juta |

| No. | Tahun | Judul Penelitian | Pendanaan | |
|---|---|---|---|---|
| | | | Sumber *) | Jml (Juta Rp.) |
| 16 | 2022 | Performa Aerodinamika Single dan Multi Elemen Wing Menggunakan Airfoil NACA 43018 pada Kondisi Take Off, Cruising, dan Landing | DIPA Poltekbang Surabaya 2022 | 20 Juta |
| 17 | 2023 | Studi Aeroakustik Penggunaan Leading-Edge Slat dan Slotted Flap Pada Wing Airfoil NACA 43018 | DIPA Poltekbang Surabaya 2023 | 20 Juta |
| 18 | 2024 | Pengaruh Bentuk Sayap Dengan Airfoil NASA SC(2)-0612 Pada Pesawat Embraer 145 | DIPA Poltekbang Surabaya 2024 | 20 Juta |

*) Tuliskan sumber pendanaan: PDM, SKW, Pemula, Fundamental, Hibah Bersaing, Hibah Pekerti, Hibah Pascasarjana, Hikom, Stranas, Kerjasama Luar Negeri dan Publikasi Internasional, RAPID, Unggulan Stranas atau sumber lainnya.

**C2. Jumlah Mahasiswa yang terlibat dalam proyek penelitian Bapak/Ibu selama 3 tahun terakhir 3 Orang**

| No | Judul Skripsi | Tahun Meluluskan | Institusi | Keterangan |
|---|---|---|---|---|
| 1 | Rancang Bangun Prototype Smart Elector Berbasis PLC Menggunakan Touch Screen | 2016 | ATKP Surabaya | Ahmad Robitoh Al Jihad |
| 2 | Rancang Bangun Monitoring Volume Air pada Water Meter Konsesioner Menggunakan Modul Arduino di Bandara Internasional Juanda Surabaya | 2016 | ATKP Surabaya | Alfian Thamrin |
| 3 | Studi Eksperimen Visualisasi Aliran Pada Airfoil NACA 0012 Dengan Vortex Generator | 2017 | Politeknik Penerbangan Surabaya | Tandyta Permata Putra |
| 4 | Rancangan Pembuatan Special Socket Wrenches Untuk Retaining Nut Pada Nose Wheel Boeing 737-200 di Politeknik Penerbangan Surabaya | 2017 | Politeknik Penerbangan Surabaya | Achmad Ilham Badruttamam |
| 5 | Studi Eksperimen Oil Flow Visualization Pada Airfoil NACA 0012 dengan Trapezoidal Vortex Generator Menggunakan Open Circuit Subsonic Wind Tunnel | 2019 | Politeknik Penerbangan Surabaya | Habibie Aldo Putra |
| 6 | Studi Eksperimen Pengaruh Penggunaan Vortex Generator Pada Airfoil NACA 0012 dengan Smoke Generator | 2019 | Politeknik Penerbangan Surabaya | Ramadhan Pradana Mahaputra |
| 7 | Studi Eksperimen Visualisasi Aliran Fluida pada Airfoil NACA 0012 dengan Triangular Vortex Generator | 2019 | Politeknik Penerbangan Surabaya | Gilang Saka Asitama |

| No | Judul Skripsi | Tahun Meluluskan | Institusi | Keterangan |
|---|---|---|---|---|
| 8 | Studi Eksperimen Pengaruh Oil Flow Visualization Terhadap Penggunaan Triangular Vortex Generator Pada Airfoil NACA 0012 | 2019 | Politeknik Penerbangan Surabaya | Ridwan Perkasa Wijaya |
| 9 | Perencanaan Struktur Perkerasan Rapid Exit Taxiway di Bandar Udara Internasional Sam Ratulangi Manado | 2019 | Politeknik Penerbangan Surabaya | Gigih Yudha Filhaq |
| 10 | Rancang Bangun Monitoring Energi Menggunakan Arduino Berbasis Web Cloud di Gedung Lab Terintegrasi Lantai II Politeknik Penerbangan Surabaya | 2019 | Politeknik Penerbangan Surabaya | Phiky Hafida Rahma |
| 11 | Perencanaan Ulang Perkerasan Taxiway N1-NP2 Dari Perkerasan Lentur Menjadi Perkerasan Kaku Di Bandar Udara Juanda Surabaya | 2019 | Politeknik Penerbangan Surabaya | Fahri Gunawan |
| 12 | Perencanaan Tebal Perkerasan Lentur Rapid Exit Taxiway Di Bandar Udara Internasional I Gusti Ngurah Rai Bali | 2019 | Politeknik Penerbangan Surabaya | Chrisdyan Akbar Wicaksono |
| 13 | Perencanaan Rekonstruksi Saluran Induk dengan Menggunakan Beton Precast di Bandar Udara Internasional Lombok | 2019 | Politeknik Penerbangan Surabaya | Josua Tangke |
| 14 | Perencanaan Tebal Perkerasan Pada Perpanjangan Landas Pacu 31 Bandar Udara Internasional Lombok – Nusa Tenggara Barat | 2019 | Politeknik Penerbangan Surabaya | Erian Aria Wijaya |
| 15 | Evaluasi Desain Drainase Runway Strip di Bandar Udara Internasional Juwata Tarakan | 2019 | Politeknik Penerbangan Surabaya | Firmanto Yusuf Aditia |
| 16 | Perencanaan Struktur Beton Pada Bangunan Atas Gedung Air Traffic Controller Dengan Sistem Rangka Pemikul Momen Khusus di Bandar Udara Sultan Muhammad Kaharuddin Sumbawa Besar | 2020 | Politeknik Penerbangan Surabaya | Raisalkam Farhan Ardiansyah |
| 17 | Perencanaan Program Pemeliharaan Fasilitas Sisi Darat di Bandar Udara Haji Muhammad Sidik Muara Teweh | 2020 | Politeknik Penerbangan Surabaya | Yuda Adi Subama |
| 18 | Perencanaan Struktur Perkerasan Lentur Pada Shoulder Taxiway B dan Taxiway C di Bandar Udara Kalimarau Berau | 2020 | Politeknik Penerbangan Surabaya | Wijang Bagus Pramu Ratmadyo |
| 19 | Perencanaan Struktur Perkerasan Kaku Surface Level Heliport di Bandar Udara Sultan Muhammad Kaharuddin - Sumbawa Besar | 2020 | Politeknik Penerbangan Surabaya | Tri Susilo |

| No | Judul Skripsi | Tahun Meluluskan | Institusi | Keterangan |
|---|---|---|---|---|
| 20 | Analisis Pengaruh Penambahan Rectangular Riblets dan V-Groove Riblets Terhadap Performa Aerodinamik Airfoil NACA 2412 | 2020 | Politeknik Penerbangan Surabaya | Nadira Wahyu Ariyanti |
| 21 | Analisa Pengaruh Penggunaan Riblet pada Airfoil NACA 2412 Menggunakan Software Ansys | 2020 | Politeknik Penerbangan Surabaya | Patricius Brian Mega Christian |
| 22 | Studi Eksperimen Tuft Flow Visualization Pada Forward Wingtip Fence Cant Angle 75$^{o}$ Terhadap Kinerja Aerodinamika Wing Airfoil E562 | 2020 | Politeknik Penerbangan Surabaya | Melando Sagala |
| 23 | Rancangan Pembuatan Alat Simulator Pengisian Fluida dengan Metode Manual dan Elektric Pump pada Shock Absorber | 2020 | Politeknik Penerbangan Surabaya | Mochammad Yusuf Baktiyar |
| 24 | Studi Eksperimen Visualisasi Aliran Fluida Pada Airfoil Eppler 562 dengan Rearward Wingtip Fence Cant Angle 75$^{o}$ | 2020 | Politeknik Penerbangan Surabaya | Moch. Aulia Ardy |
| 25 | Analisis Kinerja Personel Unit Apron Movement Control (AMC) Terhadap Ketertiban Peralatan Ground Support Equipment (GSE) di Apron PT Angkasa Pura I (Persero) Bandar Udara Internasional Jenderal Ahmad Yani Semarang | 2020 | Politeknik Penerbangan Surabaya | Arif Septian Tri Suhada |
| 26 | Penerangan Gudang Terminal Inspektor Kargo Bandara Internasional Juanda Surabaya | 2020 | Politeknik Penerbangan Surabaya | Riska Febrianti |
| 27 | Rancang Bangun Prototipe Pompa Pintar Dengan Sensor Volume Bahan Bakar Pada Genset dengan Fitur Monitoring Berbasis IoT | 2020 | Politeknik Penerbangan Surabaya | Ricky Andra Prasmono |
| 28 | Rancangan Kontrol Dan Monitoring Charging Baterai Pada Pembangkit Listrik Bertenaga Surya Berbasis Internet of Thing | 2020 | Politeknik Penerbangan Surabaya | Mohamad Wildan Prasetyo |
| 29 | Rancang Bangun Prototype Kontrol dan Monitoring Lampu Perimeter Menggunakan Smart Breaker Berbasis Internet Of Thing | 2020 | Politeknik Penerbangan Surabaya | Ujang Dede Saputra |
| 30 | Studi Eksperimen Pengaruh Penggunaan Rectangular Vortex Generator Susunan Counter-Rotating Pada Airfoil NACA 0012 Dengan Smoke Generator | 2021 | Politeknik Penerbangan Surabaya | Diyon Pratama |

| No | Judul Skripsi | Tahun Meluluskan | Institusi | Keterangan |
|---|---|---|---|---|
| 31 | Studi Eksperimen Pengaruh Penggunaan Rectangular Vortex Generator Susunan Counter-Rotating pada Airfoil Eppler 562 dengan Oil Visualization | 2021 | Politeknik Penerbangan Surabaya | Elfan Ade Nugroho |
| 32 | Analisa Pengaruh Perubahan Variasi E-Gap Breaker Point Terhadap Output Tegangan Magneto untuk Pembelajaran di Poltekbang Surabaya | 2021 | Politeknik Penerbangan Surabaya | Feri Irawan |
| 33 | Studi Eksperimen Oil Flow Visualization Karateristik Aliran Fluida di Airfoil NACA 43018 dengan Penambahan Triangular Vortex Generator | 2021 | Politeknik Penerbangan Surabaya | Ibnu Haliim Ramadhani |
| 34 | Analisis Pengaruh Penambahan Rectangular Vortex Generator Susunan Counter Rotating pada Tail Boom BO 105 | 2021 | Politeknik Penerbangan Surabaya | Ircham Manthofana |
| 35 | Analisa Pengaruh Penambahan Triangular Vortex Generator Susunan Counter-Rotating pada Tail Rotor Pylon MBB BO-105 | 2021 | Politeknik Penerbangan Surabaya | Irsal Yehezkiel Paleon |
| 36 | Analisis Pengaruh Penggunaan Triangular dan Trapezoidal Vortex Generator Terhadap Aliran Udara pada Tail Boom Helikopter BO 105 | 2021 | Politeknik Penerbangan Surabaya | Ivan Guntara Aji Saputra |
| 37 | Analisis Penambahan Rectangular dan Gothic Vortex Generator Susunan Co-Rotating pada Tail BOOM BO 105 | 2021 | Politeknik Penerbangan Surabaya | Luvan Ardiansyah |
| 38 | Analisis Aerodinamika Penggunaan Plain Flap pada Airfoil NACA 2412 | 2021 | Politeknik Penerbangan Surabaya | Riza Dwi Novianti |
| 39 | Analisis Performa Aerodinamika Penambahan V-Groove Riblets Pada Flap Dengan Airfoil NACA 2414 | 2021 | Politeknik Penerbangan Surabaya | Sulton Hidayat |
| 40 | Perencanaan Turning Area Tambahan Dekat Runway 13 dengan Rigid Pavement di Bandar Udara Internasional Jenderal Ahmad Yani – Semarang | 2021 | Politeknik Penerbangan Surabaya | Alya Syafira Ramadhani |
| 41 | Perencanaan Pembuatan Runway End Safety Area (RESA) Pada Runway 02 di Unit Penyelenggara Bandar Udara Silampari Lubuklinggau | 2021 | Politeknik Penerbangan Surabaya | Rendy Alfiano |

| No | Judul Skripsi | Tahun Meluluskan | Institusi | Keterangan |
|---|---|---|---|---|
| 42 | Perencanaan Jalan Akses di Bandar Udara Rokot Mentawai | 2021 | Politeknik Penerbangan Surabaya | Linda Maya Prebianti |
| 43 | Perencanaan Flexible Pavement Access Road Kendaraan PKP-PK di Bandar Udara Depati Parbo Kerinci | 2021 | Politeknik Penerbangan Surabaya | Zahkiyanto Ageng Wicaksono |
| 44 | Perencanaan Perkerasan Jalan Masuk di Bandar Udara Ngloram Blora | 2021 | Politeknik Penerbangan Surabaya | Avrila Bella Soraya |
| 45 | Simulasi Numerik Pengaruh Modifikasi Single Slotted Flap Pada Wing Cessna C208b Grand Caravan | 2022 | Politeknik Penerbangan Surabaya | Septian Yusuf Amali |
| 46 | Analisis Pengaruh Gothic Vortex Generator Menggunakan Computational Fluid Dynamic Pada NACA 2412 | 2022 | Politeknik Penerbangan Surabaya | Zidhane Aliffaputra Nuranto |
| 47 | Studi Eksperimen Pengaruh Penggunaan Triangular Vortex Generator Susunan Straight Pada Airfoil NACA 43018 dengan Smoke Generator | 2022 | Politeknik Penerbangan Surabaya | Fikri Maulana Rahmat |
| 48 | Studi Eksperimen Oil Flow Visualization Karateristik Aliran Fluida di Airfoil NACA 43018 dengan Penambahan Parabolic Vortex Generator | 2022 | Politeknik Penerbangan Surabaya | Zhela Trie Dhayanti |
| 49 | Studi Eksperimen Pengaruh Penggunaan Gothic Vortex Generator Susunan Counter Rotating Pada Airfoil Eppler 562 dengan Smoke Generator | 2022 | Politeknik Penerbangan Surabaya | Tegar Satria Dharmawan |
| 50 | Studi Eksperimen Karakteristik Aliran Udara di Airfoil Naca 43018 dengan Penambahan Gothic Vortex Generator Menggunakan Visualisasi Smoke Generator | 2022 | Politeknik Penerbangan Surabaya | Fikri Nur Wahyu |
| 51 | Simulasi Numerik Rectangular Vortex Generator Pada Swept Back Wing Airfoil NACA 0012 dengan Susunan Counter-Rotating | 2022 | Politeknik Penerbangan Surabaya | Verdhiana Sembodo Putra |
| 52 | Simulasi Numerik Triangular Vortex Generator Susunan Straight Pada Swept Back Wing Airfoil NACA 23018 | 2022 | Politeknik Penerbangan Surabaya | Wahyu Putra Kurniawan |
| 53 | Studi Eksperimen Pengaruh Penggunaan Triangular Vortex Generator Susunan Straight Pada Airfoil NACA 0012 dengan Smoke Generator | 2022 | Politeknik Penerbangan Surabaya | Saniyya Nahda Trysnavirensa |

| No | Judul Skripsi | Tahun Meluluskan | Institusi | Keterangan |
|---|---|---|---|---|
| 54 | Analisis Aerodinamika 3 Dimensi Penambahan Slat dan Slot Pada Airfoil NACA 23018 dengan Metode Computational Fluid Dynamic | 2022 | Politeknik Penerbangan Surabaya | Tarysa Rimadhani Hermawati |
| 55 | Optimalisasi Prosedur Pemeriksaan Keamanan Terminal Kargo di Bandar Udara Kelas I Kalimarau Berau | 2022 | Politeknik Penerbangan Surabaya | Putri Aulia Adiva Rahmah |
| 56 | Pengaruh Penambahan Variasi Konsentrasi Persentase Copper (Cu) Pada Paduan Al-Mg Terhadap Sifat Fisis Dan Kekuatan Impact | 2023 | Politeknik Penerbangan Surabaya | Aldy Priyo Jatmiko |
| 57 | Analisis Performa Aerodinamika dengan Menambahkan V-Groove Riblets Pada Flap Dengan Airfoil NACA 43018 | 2023 | Politeknik Penerbangan Surabaya | Hilmi Ryan Wicaksono |
| 58 | Studi Eksperimen Oil Flow Visualization Karateristik Aliran Fluida Penambahan Gothic Vortex Generator Pada Airfoil Naca 43018 dengan Konfigurasi X/C 10% | 2023 | Politeknik Penerbangan Surabaya | Levia Sendy Sela Sejati |
| 59 | Studi Eksperimen Karakteristik Aerodinamika Pengaruh Pada Trapezoidal Vortex Generator Airfoil Naca 43018 Dengan Oil Flow Visualization | 2023 | Politeknik Penerbangan Surabaya | Liemikko Kurnia Dainorra Maeling |
| 60 | Studi Eksperimen Performa Aerodinamika Eppler 562 Yang Dilengkapi Trapezoidal Vortex Generator Dengan Metode Oilflow Visualization | 2023 | Politeknik Penerbangan Surabaya | Daffa Syahirin Budi Pratama |
| 61 | Aerodynamic Performance Analysis By Adding U-Groove Riblets On Flaps With Naca 43018 Airfoil | 2023 | Politeknik Penerbangan Surabaya | Juanda Lefrant Tonapa |

**D. Pengalaman Pengabdian kepada Masyarakat dalam 5 Tahun Terakhir**

| No. | Tahun | Judul Pengabdian Kepada Masyarakat | Pendanaan | |
|---|---|---|---|---|
| | | | Sumber *) | Jml (Juta Rp.) |
| 1 | 2012 | Pelaksana Pengabdian Masyarakat Penyuluhan Pendidikan dan Pelatihan Penerbangan pada Sekolah Menengah Atas | DIPA BLU ATKP Surabaya | |
| 2 | 2013 | Penyuluhan Masyarakat di Bangkalan, Madura | DIPA BLU ATKP Surabaya | |

| No. | Tahun | Judul Pengabdian Kepada Masyarakat | Pendanaan | |
|---|---|---|---|---|
| | | | Sumber *) | Jml (Juta Rp.) |
| 3 | 2015 | Pelaksana Pengabdian Masyarakat Penyuluhan Pendidikan dan Pelatihan Penerbangan pada Sekolah Menengah Atas | DIPA BLU ATKP Surabaya | |
| 4 | 2016 | Penyuluhan Masyarakat di Desa Bangeran, Ndawar Blandong, Jombang | DIPA BLU ATKP Surabaya | |
| 5 | 2017 | Kegiatan Bakti Sosial Penyuluhan dan Pengobatan Gratis untuk Lansia dan Balita serta Pembagian Sembako Gratis Bagi Warga Kurang Mampu Dusun Selo Dingin Desa Siwalan Kec. Panceng Kab. Gresik | DIPA BLU ATKP Surabaya | |
| 6 | 2018 | Kegiatan Bakti Sosial Pembersihan Saluran, Pembuatan Papan Rambu Masuk dan Pengaspalan Jalan Lingkungan Politeknik Penerbangan Surabaya | DIPA BLU Politeknik Penerbangan Surabaya | |
| 7 | 2019 | Kegiatan Bakti Sosial Renovasi Mushola Roudhotul Jannah di Desa Watu Agung, Kecamatan Bungah, Kabupaten Gresik | DIPA BLU Politeknik Penerbangan Surabaya | |
| 8 | 2020 | Pelatihan Basic Wet Lay Up Composite Repair System Untuk Sekolah Vokasi Penerbangan | DIPA BLU Politeknik Penerbangan Surabaya | |
| 9 | 2022 | Penyuluhan Pengolahan Air Bersih dan Pembuatan Penampung Air | DIPA BLU Politeknik Penerbangan Surabaya | |
| 10 | 2022 | Pelatihan Perawatan Mesin Motor Bakar | DIPA BLU Politeknik Penerbangan Surabaya | |
| 11 | 2023 | Perancangan Alat Pembakaran Sampah Tanpa Asap (APSTA) Sebagai Solusi Mengatasi Pencemaran Lingkungan Di Kompleks Perhubungan Siwalankerto Surabaya | DIPA BLU Politeknik Penerbangan Surabaya | |
| 12 | 2023 | Penerapan Helical Turbin Savonius untuk Penerangan Jalan Umum di Mushola banun Nandir Desa Banjaranyar Kecamatan Tanjunganom Kabupaten Nganjuk | DIPA BLU Politeknik Penerbangan Surabaya | |

*) Tuliskan sumber pendanaan : Penerapan IPTEKS – SOSBUD, Vucer, Vucer Multitahun, UJI, Sibermas, atau sumber dana lainnya

**E. Pengalaman Penulisan Artikel Ilmiah dalam Jurnal dalam 5 Tahun Terakhir baik Nasional maupun Internasional**

**Sebagai Penulis Pertama**

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| 1. | Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan Dan Computer Base Training Pada | Jurnal ATKP Surabaya | Edisi V Desember 2013 ISSN : 1978-6832 | 2013 | Nasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | Lathe Machine Di Laboratorium General Workshop Program Studi Teknik Pesawat Udara Jurusan Teknik Penerbangan ATKP Surabaya | | | | |
| 2. | Rancangan Modifikasi Sistem Kontrol Constant Current Regulator (CCR) Type BNF 1200 Menggunakan Programmable Logic Control (PLC) di Bandar Udara | Jurnal ATKP Surabaya | Edisi VI Oktober 2013 ISSN : 1978-6832 | 2013 | Nasional |
| 3. | Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan Dan Computer Base Training Pada Piston Engine di Laboratorium Teknik Pesawat Udara Jurusan Teknik Penerbangan ATKP Surabaya | Jurnal ATKP Surabaya | Edisi VIII Desember 2014 ISSN : 1978-6832 | 2014 | Nasional |
| 4. | Studi Numerik Efek Variasi Posisi Vortex Generator Terhadap Boundary Layer Pada Airfoil NACA 43018 | Seminar Teknologi dan Rekayasa (SENTRA) 2015 Universitas Muhammadiyah Malang (UMM) ISBN: 978-979-796-238-6 | | 2015 | Nasional |
| 5. | Studi Numerik Efek Variasi Posisi Vortex Generator Terhadap Koefisien Lift dan Koefisien Drag Pada Airfoil NACA 43018 di Sayap Pesawat ATR 72 Seri 500/600 | Jurnal ATKP Surabaya | Edisi IX Januari-April 2015 ISSN : 1978-6832 | 2015 | Nasional |
| 6. | Studi Numerik Efek Penggunaan Vortex Generator Terhadap Boundary Layer Airfoil NACA 23018 | Jurnal ATKP Surabaya | Edisi X Mei-Agustus 2015 ISSN : 1978-6832 | 2015 | Nasional |
| 7. | Studi Numerik Efek Penggunaan Vortex Generator Terhadap Boundary Layer Airfoil NACA 23018 | Seminar Nasional Teknologi Terapan 2015 Sekolah Vokasi Universitas Gadjah Mada ISBN 978-602- | | 2015 | Nasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | | 1159-16-3 | | | |
| 8. | Analisis Aerodinamika Penggunaan Wingtip Fence Pada Wing Airfoil NACA 43018 | Jurnal ATKP Surabaya | Edisi XII April 2016 ISSN : 1978-6832 | 2016 | Nasional |
| 9. | Analisis Aerodinamika Perbandingan Vortex Generator Pada Wing Airfoil NACA 43018 Susunan Straight Dan Counter Rotating (Studi Kasus Peletakan Vortex Generator x/c =10% dan 20%) | Jurnal ATKP Surabaya | Edisi XII April 2016 ISSN : 1978-6832 | 2016 | Nasional |
| 10 | Numerical study of aerodynamic analysis on wing airfoil NACA 43018 with the addition of forward and rearward wingtip fence | Proceedings of the International Mechanical Engineering and Engineering Education Conferences (IMEEEC 2016) (Scopus) | I / October 2016 AIP Conf. Proc. 1778, 030011-1–030011-9; doi: 10.1063/1.4965745 | 2016 | Seminar Internasional |
| 11 | Studi Numerik Efek Perbandingan Penambahan Wingtip Fence Dan Blended Winglet Terhadap Performa Aeorodinamika Airfoil NACA 23018 | Prosiding Seminar Nasional Teknik Mesin Jurusan Teknik Mesin Fakultas Teknik Universitas Jember | ISSN: 2541-6987 Vol : I/November 2016 | 2016 | Nasional |
| 12 | Numerical Study of Flow Characteristics Around Wing Airfoil Eppler 562 with Variations of Rearward Wingtip Fence | The 3rd International Conference on Mechanical Engineering (ICOME) Departemen Teknik Mesin FTI ITS (Scopus) | AIP Conference Proceedings 1983, 020011 (2018); doi: 10.1063/1.5046207 | 2017 | Seminar Internasional |
| 13 | Numerical Simulation of Airfoil Eppler 562 with Variations of Whitcomb Wingtip Devices | The 3rd International Conference on Mechanical Engineering | AIP Conference Proceedings 1983, 020003 (2018); doi: 10.1063/1.5046199 | 2017 | Seminar Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | | (ICOME) Departemen Teknik Mesin FTI ITS (Scopus) | | | |
| 14 | Drag Reduction Analysis of Wing Airfoil E562 with Forward Wingtip Fence at Cant Angle Variations of 75$^{o}$ and 90$^{o}$ | 9$^{th}$ International Conference of Thermofluids 2017 Universitas Gadjah Mada (Scopus) | AIP Conference Proceedings 2001, 050003 (2018); doi: 10.1063/1.5049994 | 2017 | Seminar Internasional |
| 15 | Analisis Perbandingan Velocity Dan Shear Stress Perkembangan Boundary Layer Flat Plate Menggunakan Turbulent Model k – ε (Standard, Realizable, RNG) | Jurnal Penelitian | VOL. 2 NO. 1 (2017): Jurnal Penelitian Maret 2017 | 2017 | Nasional |
| 16 | Simulasi Dinamika Aliran Turbulen Pada Flat Plate Boundary Layer Menggunakan Turbulent Model k – ε (Standard, Realizable, RNG) | APPROACH: Jurnal Teknologi Penerbangan | Vol. 1 No. 1 (2017): April 2017 | 2017 | Nasional |
| 17 | Studi Numerik Karakteristik Separasi dan Reattachment Aliran Di Belakang Gundukan (BUMP) Setengah Lingkaran | Jurnal Penelitian | VOL. 2 No. 2 (2017): Jurnal Penelitian Juni 2017 | 2017 | Nasional |
| 18 | Karakteristik Aliran di Belakang Gundukan (Bump) Segitiga Pada Plat Datar | Jurnal Penelitian | VOL. 2 No. 3 (2017): Jurnal Penelitian September 2017 | 2017 | Nasional |
| 19 | Analisis Aerodinamika Pada Wingtip Fence Cessna 172 di Laboratorium Teknik Pesawat Udara ATKP Surabaya | APPROACH: Jurnal Teknologi Penerbangan | Vol. 1 No. 2 (2017): Oktober 2017 | 2017 | Nasional |
| 20 | Separasi dan Reattachment Aliran di Belakang Gundukan (Bump) Setengah Lingkaran, Segitiga dan Persegi Panjang | Jurnal Penelitian | VOL. 2 NO. 4 (2017): Jurnal Penelitian Desember 2017 | 2017 | Nasional |
| 21 | Numerical study of flow characteristics on wing airfoil eppler 562 with whitcomb winglet variations | International Mechanical and Industrial Engineering Conference (IMIEC 2018) Mechanical | MATEC Web of Conferences 204, 04009 (2018) IMIEC 2018 https://doi.org/10.1051/matecco | 2018 | Seminar Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | | Engineering Department, Universitas Negeri Malang (Scopus) | nf/201820404009 | | |
| 22 | Aerodynamics Analisys of The Wingtip Fence Effect on UAV Wing | International Review of Mechanical Engineering (I.RE.M.E.), Italy (Scopus) | Vol 12, No 10 (2018) DOI: https://doi.org/10.15866/ireme.v12i10.15517 | 2018 | Jurnal Internasional |
| 23 | Simulasi Numerik Perbandingan Karakteristik Aliran Pada Penambahan Spiral di Ujung Nozzle | Jurnal Penelitian | VOL. 3 NO. 1 (2018): Jurnal Penelitian Maret 2018 | 2018 | Nasional |
| 24 | Studi Eksperimental tentang Karakteristik Airfoil NACA 0015 Berskat Bagian atas dengan Variasi Jarak Skat | Jurnal Penelitian | VOL. 3 NO. 2 (2018): Jurnal Penelitian Juni 2018 | 2018 | Nasional |
| 25 | Investigasi Perbandingan Posisi Rectangular Flat Plate Vortex Generator dengan Posisi Straight pada Wing Airfoil NACA 43018 | Jurnal Penelitian | VOL. 3 NO. 3 (2018): Jurnal Penelitian September 2018 | 2018 | Nasional |
| 26 | Studi Numerik Dan Eksperimental Perbandingan Bentuk Vortex Generator Dengan Posisi Straight Pada Wing Airfoil NACA 43018 | APPROACH: Jurnal Teknologi Penerbangan | Vol. 2 No. 2 (2018): Oktober 2018 | 2018 | Nasional |
| 27 | Studi Eksperimen Visualisasi Aliran Pada Airfoil NACA 0012 Dengan Vortex Generator | APPROACH: Jurnal Teknologi Penerbangan | Vol. 2 No. 2 (2018): Oktober 2018 | 2018 | Nasional |
| 28 | Efek Penggunaan Vortex Generator Terhadap Karakteristik Aliran pada Airfoil NACA 43018 | Jurnal Penelitian | VOL. 3 NO. 4 (2018): Jurnal Penelitian Desember 2018 | 2018 | Nasional |
| 29 | Karakteristik Wake Area Akibat Efek Penggunaan Vortex Generator di Belakang Wing Airfoil Naca 43018 | Jurnal Penelitian | VOL. 4 NO. 1 (2019): Jurnal Penelitian Maret 2019 | 2019 | Nasional |
| 30 | Studi Numerik Penggunaan Vortex Generator Pada Wing Airfoil NACA 43018 | Jurnal Penelitian | VOL. 4 NO. 3 (2019): Jurnal Penelitian September 2019 | 2019 | Nasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| 31 | Studi Eksperimen Oil Flow Visualization Pada Airfoil NACA 0012 Dengan Trapezoidal Vortex Generator Menggunakan Open Circuit Subsonic Wind Tunnel | Jurnal Penelitian | VOL. 4 NO. 4 (2019): Jurnal Penelitian Desember 2019 | 2019 | Nasional |
| 32 | Numerical Analysis of the Reynolds Number Effect on the Aerodynamic Performance Wing Airfoil Eppler 562 with Wingtip Fence | The 1st International Conference on Engineering and Applied Science UNIPMA | Journal of Physics: Conference Series 1381 (2019) 012055 IOP Publishing doi:10.1088/1742-6596/1381/1/012055 | 2019 | Seminar Internasional |
| 33 | Experimental and numerical study on the boundary layer flow over a flat plate with a semi-circular bump with and without a transversal wire | The 4th International Conference on Mechanical Engineering (ICOME) 2019 | AIP Conference Proceedings 2187, 020039 (2019); https://doi.org/10.1063/1.5138294 Published Online: 10 December 2019 | 2019 | Seminar Internasional |
| 34 | Numerical study of three-dimensional flow characteristics around the wing airfoil E562 with forward and rearward wingtip fence | The 4th International Conference on Mechanical Engineering (ICOME) 2019 | AIP Conference Proceedings 2187, 020017 (2019); https://doi.org/10.1063/1.5138272 Published Online: 10 December 2019 | 2019 | Seminar Internasional |
| 35 | Numerical Study of theWingtip Fence on theWing Airfoil E562 with Fence Height Variations | Proceedings of the 6th International Conference and Exhibition on Sustainable Energy and Advanced Materials ICE-SEAM UNS 2019 | Lecture Notes in Mechanical Engineering ISBN 978-981-15-4480-4 ISBN 978-981-15-4481-1 (eBook) https://doi.org/10.1007/978-981-15-4481-1 | 2020 | Seminar Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| 36 | Comparative Study of Forward Wingtip Fence and Rearward Wingtip Fence on Wing Airfoil Eppler E562 | JEMMME (Journal of Energy, Mechanical, Material, and Manufacturing Engineering) | Vol. 5, No. 1, May 2020 http://dx.doi.org/10.22219/jemmme.v5i1.11968 ISSN 2541-6332 \| e-ISSN 2548-4281 Journal homepage: http://ejournal.umm.ac.id/index.php/JEMMME | 2020 | Jurnal Terakreditasi Nasional (SINTA 3) |
| 37 | Studi Eksperimen Pengaruh Penggunaan Vortex Generator Pada Airfoil NACA 0012 Dengan Smoke Generator | Jurnal Penelitian | Vol. 5 No. 1 (2020): Jurnal Penelitian Maret 2020 | 2020 | Nasional |
| 38 | Analisis Pengaruh Penambahan Rectangular Riblets Dan V-Groove Riblets Terhadap Performa Aerodinamika Airfoil NACA 2412 | Jurnal Penelitian | Vol. 5 No. 3 (2020): Jurnal Penelitian September 2020 | 2020 | Nasional |
| 39 | Comparative Study Aerodynamics Effects of Wingtip Fence Winglet on Fix Wing Airfoil Eppler E562 | WARTA ARDHIA Jurnal Perhubungan Udara | p-ISSN: 0215-9066 (print), e-ISSN: 2528-4045 https://dx.doi.org/10.25104/wa.v45i2.356.67-76 | 2020 | Nasional Terakreditasi |
| 40 | Numerical Study of Secondary Flow Characteristics on the Use of the Winglets | Journal of Physics: Conference Series 1726 (2021) 012012 | 3rd Borneo International Conference on Applied Mathematics And Engineering (BICAME) IOP Publishing doi:10.1088/1742-6596/1726/1/012012 | 2021 | Internasional |
| 41 | Comparison of the winglet aerodynamic performance in | IOP Conference Series: Materials Science and | The 6th International Conference of Science, | 2021 | Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | unmanned aerial vehicle at low Reynolds number | Engineering, Volume 1173, | Technology, and Interdisciplinary Research 2020 (IC-STAR 2020) 20th-21st October 2020, Bandar Lampung, Indonesia IOP Conf. Series: Materials Science and Engineering1173 (2021) 012002 IOP Publishing doi:10.1088/1757-899X/1173/1/012002 2 | | |
| 42 | Vortex development analysis effects of the use of winglets on Airfoil E562 in unmanned aerial vehicles | IOP Conference Series: Materials Science and Engineering, Volume 1034, | 2nd International Conference on Mechanical Engineering Research and Application (iCOMERA 2020) 7th–9th October 2020, Malang, Indonesia IOP Conf. Series: Materials Science and Engineering 1034 (2021) 012031 doi:10.1088/1757-899X/1034/1/012031 | 2021 | Internasional |
| 43 | Numerical study of three-dimensional flow characteristics around swept-back angle 0°, 15°, and 30° on wing airfoil Eppler 562 | AIP Conference Proceedings 2366, 030014 (2021); | The 2020 International Seminar on Aerospace Science and | 2021 | Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | | https://doi.org/10.1063/5.0060192 | Technology (ISAST) | | |
| 44 | Characteristics of Separation and Induced Drag in the Use of Swept-back Wing Unmanned Aerial Vehicle | Journal of Physics: Conference Series 2117 (2021) 012013 1 doi:10.1088/1742-6596/2117/1/012013 | Prosiding ICATECH 2021 | 2021 | Internasional |
| 45 | Stall Behavior Curved Planform Wing Analysis with Low Reynolds Number on Aerodynamic Performances of Wing Airfoil Eppler 562 | Journal of Mechanical Engineering College of Engineering, Universiti Teknologi MARA (UiTM), Malaysia | Vol 19(1), 201-220, 2022 ISSN 1823-5514, eISSN 2550-164X© 2022 | 2022 | Internasional |
| 46 | Aerodynamic Characteristics of the Wing Airfoil NACA 43018 in Take Off Conditions with Slat Clearance and Flap Deflection | Part of the Lecture Notes in Mechanical Engineering book series (LNME) | Recent Advances in Mechanical Engineering pp 220–229 DOI: 10.1007/978-981-19-0867-5_27 | 2022 | Internasional |
| 47 | Effect of Leading-Edge Gap Size on Multiple-Element Wing NACA 43018 | International Review of Aerospace Engineering | Vol 15, No 6 (2022) DOI: https://doi.org/10.15866/irease.v15i6.22664 | 2022 | Internasional |
| 48 | Effect of changes in flap deflection and addition of slat clearance on aerodynamic performance of the wing airfoil NACA 43018 in the cruising and landing phases | AIP Conference Proceedings | Proceeding of International Conference on Mechanical Engineering for Emerging Technologies (ICOMEET 2021) | 2023 | Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | | | AIP Conf. Proc. 2592, 040005-1–040005-6; https://doi.org/10.1063/5.0115108 | | |
| 49 | Aerodynamic Characteristics of Fluid Flow on Multiple-Element Wing Airfoil NACA 43018 with Leading-Edge Slat and Plain Flap | Journal of Engineering Science and Technology | http://jestec.taylors.edu.my/Special%20Issue%20ICIST%202022_1/ICIST_1_04.pdf | 2023 | Internasional |
| 50 | Aerodynamic Characteristics of the Wing Airfoil NACA 43018 in Take Off Conditions with Slat Clearance and Flap Deflection | Lecture Notes in Mechanical Engineering | https://link.springer.com/chapter/10.1007/978-981-19-0867-5_27 | 2023 | Internasional |
| 51 | Aerodynamic and Aeroacoustic Study of Using Multiple-Element-Wing Leading-Edge Slat on Plain and Slotted Flap Wing Airfoil NACA 43018 | Journal of Applied Science and Engineering (Taiwan) | 2024 – Volume 27 Volume 27, Issue 10 04 January 2024 https://doi.org/10.6180/jase.202410_27(10).0009 | 2024 | Internasional |
| 52 | Numerical Study on Single and Multi-Element NACA 43018 Wing Airfoil with Leading-Edge Slat and Slotted Flap | International Journal of Automotive and Mechanical Engineering | ISSN: 2229-8649 e-ISSN: 2180-1606 VOL. 21, ISSUE 3, 2024, 11652–11662 DOI: https://doi.org/10.15282/ijame.21.3.2024.16.0899 Published by Universiti Malaysia Pahang Al-Sultan Abdullah | 2024 | Internasional |
| 53 | Effect of flap deflection on single-element wing flow | AIP Conference Proceedings | AIP Conf. Proc. 3124, 060002 (2024) | 2024 | Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | characteristics in wing airfoil NACA 43018 | | https://doi.org/10.1063/5.0227766 Proceeding of The 8th International Conference and Exhibition on Sustainable Energy and Advanced Materials (ICE-SEAM) 2022 | | |

**Sebagai Penulis Kedua dan seterusnya**

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| 1. | Effect of Using Triangular Vortex Generator Straight Arrangement in Air Naca 43018 with Smoke Generator. | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 2. | Experimental Study of the Effect of Using a Gothic Vortex Generator Counter Rotating Arrangement on Wing Airfoil Eppler 562 with a Smoke Generator. | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 3. | Experimental Study of Fluid Flow Characteristics in Wing Airfoil NACA 43018 with Parabolic Vortex Generator Using Oil Flow Visualization. | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 4. | Numerical Simulation of Rectangular Vortex Generator in Sweptback Wing Airfoil NACA 0012 with Counter-Rotating Position. | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 5. | Numerical Simulation of Effect Modification of Single | Advances in Engineering | https://www.atlantis- | Februari 2023 | Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | Slotted Flap on Wing Cessna C208B Grand Caravan for Aerodynamic Performance. | Research. | press.com/proceedings/icateas-22/125984568 | | |
| 6. | Experimental Study of Airflow Characteristics in Airfoil Naca 43018 with the Addition of Gothic Vortex Generator Using Visualization of Smoke Generator. | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 7. | Analysis of the Effect of Gothic Vortex Generator Using Computational Fluid Dynamic on NACA 2412. | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 8. | Analysis Perfomance Adding V-Groove Riblets on Flap with NACA 43018 Airfoil | Prosiding ICATEAS Poltekbang Surabaya | https://ejournal.poltekbangsby.ac.id/index.php/icateass/article/view/1698 | November 2023 | Internasional |
| 9. | Aerodynamic Performance Analysis By Adding U-Groove Riblets on Flaps With NACA 43018 Airfoil | Prosiding ICATEAS Poltekbang Surabaya | https://ejournal.poltekbangsby.ac.id/index.php/icateass/article/view/1698 | November 2023 | Internasional |
| 10 | Detection Tool For Underground Cable Lines And Connections in Distribution Systems Based on Radio Frequency Identification (RFID) | Prosiding ICATEAS Poltekbang Surabaya | https://ejournal.poltekbangsby.ac.id/index.php/icateass/article/view/1702 | November 2023 | Internasional |
| 11 | Prototype Power House Security System Using Face Identification and Microcontroller-Based Vehicle Identification | Prosiding ICATEAS Poltekbang Surabaya | https://ejournal.poltekbangsby.ac.id/index.php/icateass/article/view/1703 | November 2023 | Internasional |
| 12 | A Socialization Method For Increasing Dangerous Goods Knowledge of Passenger | Prosiding ICATEAS Poltekbang Surabaya | https://ejournal.poltekbangsby.ac.id/index.php/icateass/article/view/1706 | November 2023 | Internasional |
| 13 | Optimization of offset and cant angle winglet on remote | Journal of Mechanical | Volume 17 No. 4, (December 2023) | 2023 | Internasional |

| No. | Judul Artikel Ilmiah | Nama Jurnal | Volume/Nomor | Tahun publikasi | Tingkat Lokal/Nasional /Internasional |
|---|---|---|---|---|---|
| | control airplane using Taguchi–Particle swarm optimization | Engineering and Sciences, | https://journal.ump.edu.my/jmes/article/view/8629 | | |
| 14 | The effect of slat clearance and flap on the aerodynamic performance of the NACA 43018 wing in the landing process | AIP Conference Prosoding | https://pubs.aip.org/aip/acp/article-abstract/2677/1/030001/2901456/The-effect-of-slat-clearance-and-flap-on-the?redirectedFrom=fulltext | Juli 2023 | Internasional |
| 15 | Numeric Simulation of Triangular Vortex Generator Straight on Swept-Back Wing Airfoil NACA 23018 | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 16 | Experimental Study of Fluid Flow Characteristics in Wing Airfoil NACA 43018 with Parabolic VG Using Oil Flow VIsualization | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 17 | Experimental Study of Fluid Flow Characteristics in Wing Airfoil Naca 43018 with Parabolic Vortex Generator Using Oil Flow Visualization | Advances in Engineering Research. | https://www.atlantis-press.com/proceedings/icateas-22/125984568 | Februari 2023 | Internasional |
| 19 | Collapse Behavior and Energy Absorption Characteristics of Design Multi-Cell Thin Wall Structure 3D-Printed Under Quasi Statistic Loads | Automotive Experiences Vol 7 No 1 (2024) https://doi.org/10.31603/ae.10892 | https://journal.unimma.ac.id/index.php/AutomotiveExperiences/article/view/10892 | Mei 2024 | Internasional |
| 20 | Analisis Tegangan Penambal Dan Gaya Paku Keling Pada Pemasangan Antena ATC Transponder Pesawat Boeing 737-200 | Langit Biru: Jurnal Ilmiah Aviasi | Vol. 16 No. 02 Bulan Juni Hal. 117 : 128 ISSN (p) 1979-1534 ISSN (e) 2745-8695 | Juni 2024 | Nasional |

**F. Kegiatan Dosen Dalam Seminar ilmiah / lokakarya / penataran / *workshop* / pagelaran / pameran / peragaan.**

| No. | Jenis Kegiatan* | Waktu | Tempat | Sebagai | |
|---|---|---|---|---|---|
| | | | | Penyaji | Peserta |
| **Seminar** | | | | | |
| 1 | Seminar Tantangan dan Peluang Kerja Dunia Penerbangan | 2013 | ATKP Surabaya | Peserta | |
| 2 | Seminar Nasional Dampak Lingkungan Hidup Terhadap Transportasi | 2013 | ATKP Surabaya | Peserta | |
| 3 | Seminar Penelitian Ilmu Pengetahuan Terapan "Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan dan Computer Base Training Pada Trainer Cessna 172" | 2013 | ATKP Surabaya | Penyaji | |
| 4 | Seminar Penelitian Ilmu Pengetahuan Terapan "Pengembangan Modul Pembelajaran Berbasis Kecerdasan Buatan dan Computer Base Training Pada Piston Engine Trainer" | 2014 | ATKP Surabaya | Penyaji | |
| 5 | Seminar Nasional "Disiplin dan Tertib Tata Kelola Dalam Rangka Peningkatan Pelayanan Prima | 2015 | ATKP Surabaya | Peserta | |
| 6 | Seminar Nasional Teknologi Terapan 2015 | 2015 | Sekolah Vokasi UGM | Penyaji | |
| 7 | Seminar Nasional Teknologi dan Rekayasa 2015 | 2015 | Fakultas Teknik Universitas Muhammadiyah Malang | Penyaji | |
| 8 | International Seminar E-Learning : Design, Development, Management and Utilization | 2016 | Universitas Negeri Surabaya | Penyaji | |
| 9 | International Mechanical Engineering And Engineering Education Conferences 2016 | 2016 | Mechanical Engineering Departement of Universitas Negeri Malang | Penyaji | |
| 10 | Radar Role In Supporting CNS-ATM and Implementation In The European Sky | 2016 | ATKP Surabaya | Peserta | |
| 11 | Seminar Nasional Teknik Mesin "Alih Teknologi untuk Kemandirian Bangsa" | 2016 | Universitas Jember | Penyaji | |
| 12 | The 3rd International Seminar on Science and Technology (ISST) 2017 | 2017 | Pasca Sarjana ITS | Penyaji | |
| 13 | The 3rd International Conference on Mechanical Engineering (ICOME) Departemen Teknik Mesin FTI ITS | 2017 | Departemen Teknik Mesin FTI ITS | Penyaji | |

| No. | Jenis Kegiatan* | Waktu | Tempat | Sebagai | |
|---|---|---|---|---|---|
| | | | | Penyaji | Peserta |
| 14 | 9th International Conference on Thermofluids 2017 | 2017 | Department of Mechanical and Industrial Engineering Faculty of Engineering, Universitas Gadjah Mada | Penyaji | |
| 15 | International Mechanical and Industrial Engineering Conference (IMIEC 2018) Mechanical Engineering Department, Universitas Negeri Malang | 2018 | Mechanical Engineering Department, Universitas Negeri Malang | Penyaji | |
| 16 | The International Conference on Engineering Technology, Advanced Science and Industrial Application 2018 (ICETASIA 2018) | 2018 | Mechanical Industry Engineering Department FV ITS, Surabaya Indonesia, National Taiwan University of Science and Technology (NTUST), Politeknik Manufaktur Negeri Bandung (POLMAN Bandung), and Politeknik Manufaktur Astra (POLMAN Astra) | Penyaji | |
| 17 | The 1st International Conference on Engineering and Applied Science | 2019 | Universitas PGRI Madiun | Penyaji | |
| 18 | ICOME 2019 Innovative Science and Technology in Mechanical Engineering for Industry 4.0 | 2019 | Departemen Teknik Mesin FTI ITS | Penyaji | |
| 19 | International Conference on Climate Change and Sustainability Engineering in ASEAN (CCSE-ASEAN)2019 | 2019 | Universitas Jember | Penyaji | |
| 20 | The 6th International Conference and Exhibition on Sustainable Energy and Advanced Materials (ICE-SEAM 2019) | 2019 | Fakultas Teknik UNS Solo | Penyaji | |

| No. | Jenis Kegiatan* | Waktu | Tempat | Sebagai | |
|---|---|---|---|---|---|
| | | | | Penyaji | Peserta |
| 21 | The 2nd International Conference on Mechanical Engineering Research and Application (ICOMERA) 2020 | 2020 | Departemen Teknik Mesin, Fakultas Teknik, Universitas Brawijaya | Penyaji | |
| 22 | The 6th International Conference on Science, Technology, and Inter-disciplinary Research (IC-STAR) 2020 | 2020 | Fakultas Teknik Universitas Lampung | Penyaji | |
| 23 | 3rd Borneo International Conference on Applied Mathematics and Engineering | 2020 | Institut Teknologi Kalimantan | Penyaji | |
| 24 | The 1st International Conference on Research in Science and Technology | 2020 | Universitas Pamulang | Penyaji | |
| 25 | International Seminar on Aerospace Science and Technology (ISAST) VIII | 2020 | LAPAN | Penyaji | |
| 26 | The 3rd International Conference on Advanced Engineering and Technology (ICATECH) | 2021 | ITATS | Penyaji | |
| 27 | International Conference and Exhibition on Sustainable Energy and Advanced Materials (ICESEAM) 2022 | 2022 | Universitas Sebelas Maret (UNS) dan University Teknikal Malaysia Melaka (UteM) | Penyaji | |
| 28 | International Conference on Vocational, Industrial and Professional Application (VIPRO) 2022 | 2022 | Forum Pendidikan Tinggi Vokasi se-Indonesia (FPTVI) – Fakultas Vokasi Institut Teknologi Sepuluh Nopember (ITS) | Penyaji | |
| 29 | The 4th International Conference on Innovation in Science and Technology | 2022 | Politeknik Negeri Semarang | Penyaji | |
| 30 | The 1st International Conference on Advance Transportation, Engineering, and Applied Science (ICATEAS 2022) | 2022 | Politeknik Penerbangan Surabaya | Penyaji | |
| 31 | The 5th International Conference on Innovation in Science and Technology | 2023 | Politeknik Negeri Semarang | Penyaji | |
| 32 | The 2nd International Conference on Advance Transportation, Engineering, and Applied Science (ICATEAS 2023) | 2023 | Politeknik Penerbangan Surabaya | Penyaji | |

| No. | Jenis Kegiatan* | Waktu | Tempat | Sebagai | |
|---|---|---|---|---|---|
| | | | | Penyaji | Peserta |
| **Penataran / Workshop /Training** | | | | | |
| 1 | Pneumatic Hydraulic | 2009 | ATKP Surabaya | Peserta | |
| 2 | General Workshop | 2009 | ATKP Surabaya | Peserta | |
| 3 | Sheet Metal Shop | 2009 | ATKP Surabaya | Peserta | |
| 4 | Prajabatan | 2010 | PAP BOGOR | Peserta | |
| 5 | Pengadaan | 2010 | UNAIR | Peserta | |
| 6 | Pranata Komp. | 2010 | Surabaya | Peserta | |
| 7 | Instructor Course BOEING | 2011 | ATKP Surabaya | Peserta | |
| 8 | Computer Base Training | 2011 | USA | Peserta | |
| 9 | Engine Trainer | 2011 | USA | Peserta | |
| 10 | Safety Management System | 2012 | ATKP Surabaya | Peserta | |
| 11 | Basic Lisence A1 A4 | 2012 | ATKP Surabaya | Peserta | |
| 12 | Type Rating Cessna Group I | 2012 | ATKP Surabaya | Peserta | |
| 13 | Penyusunan Anggaran Berbasis Kinerja (PABK) | 2013 | PAP Bogor | Peserta | |
| 14 | TOT Human Factor | 2013 | Curug | Peserta | |
| 15 | Composite Repair I | 2013 | Philipina | Peserta | |
| 16 | Composite Repair II | 2013 | Philipina | Peserta | |
| 17 | Basic Airworthiness Inspector | 2014 | ATKP Surabaya | Peserta | |
| 18 | Air Operator Surveillance | 2015 | OTBAN Juanda | Peserta | |
| 19 | Composite Repair III | 2015 | USA | Peserta | |
| 20 | Reciprocating Engine TSIO-520 Removal and Displacement | 2015 | USA | Peserta | |
| 21 | Turboprop Engine PT6A-20 Removal and Displacement | 2015 | USA | Peserta | |
| 22 | CBT LMS and Client Software | 2015 | USA | Peserta | |
| 23 | Basic Lisence C1 C2 C4 | 2015 | ATKP Surabaya | Peserta | |
| 24 | Pekerti Applied-Approach (A-A) | 2016 | UNS Solo | Peserta | |
| 25 | Type Rating Cessna 172 | 2016 | BP3 Banyuwangi | Peserta | |
| 26 | Type Rating TBM 700 | 2016 | ATKP Surabaya | Peserta | |
| 27 | Pelatihan Pengembangan E-Learning Bagi Admin Akademik Politeknik Penerbangan Surabaya | 2019 | Politeknik Penerbangan Surabaya | Peserta | |
| 28 | Refreshing CASR | 2019 | Politeknik Penerbangan Surabaya | Peserta | |
| 29 | Recurrent Human Factor | 2019 | Politeknik Penerbangan Surabaya | Peserta | |

| No. | Jenis Kegiatan* | Waktu | Tempat | Sebagai | |
|---|---|---|---|---|---|
| | | | | Penyaji | Peserta |
| 30 | Basic Inspector for Engineer | 2019 | Akademi Penerbangan Indonesia Banyuwangi | Peserta | |
| 31 | Basic Inspector and Audit Techniques Course | 2019 | Politeknik Penerbangan Surabaya | Peserta | |
| 32 | Webinar Tantangan Pendidikan Vokasi pada Era Pandemi Covid 19 | 2019 | Politeknik Penerbangan Surabaya | Peserta | |
| 33 | Diklat Basic Perawatan Helikopter A2 | 2020 | Politeknik Penerbangan Surabaya | Peserta | |
| 34 | Program Profesi Insinyur | 2021 | Universitas Jember | Peserta | |
| 35 | Human Factor | 2021 | Politeknik Penerbangan Surabaya | Peserta | |
| 36 | Safety Management System | 2021 | Politeknik Penerbangan Surabaya | Peserta | |
| 37 | Type Rating Cessna 172 | 2021 | Politeknik Penerbangan Surabaya | Peserta | |
| 38 | Training Developer Course | 2021 | Train Air Plus | Peserta | |
| 39 | Unmanned Aerial Fundamentals | 2021 | Train Air Plus | Peserta | |
| 40 | Workshop PAK Online dan Penggunaan Repository | 2022 | Politeknik Penerbangan Surabaya | Peserta | |
| 41 | Workshop Penulisan Artikel Ilmiah | 2022 | Rumah Penelitian | Peserta | |
| 42 | Seminar Nasional Badan Kejuruan Dirgantara Persatuan Insinyur Indonesia | 2022 | Badan Kejuruan Dirgantara Persatuan Insinyur Indonesia | Peserta | |
| 43 | Business English Workshop | 2022 | Politeknik Penerbangan Surabaya-CV Eduka Swatantra-EIE | Peserta | |

| No. | Jenis Kegiatan* | Waktu | Tempat | Sebagai | |
|---|---|---|---|---|---|
| | | | | Penyaji | Peserta |
| 44 | Inhouse Training QA | 2022 | Equal-Learning Centre of Management | Peserta | |
| 45 | Workshop Kreatif Menjadi Penulis Artikel Ilmiah dan Buku, Editor, Reviewer dan Pengelola Jurnal | 12-13 Mei 2023 (42 JP) | UNISMA PRESS Universitas Islam Malang | Peserta | |
| 46 | Workshop WIKO "Penggunaan ChatGPT untuk Penulisan Ilmiah Beretika" | 23 November 2023 | WIKO | Peserta | |
| 47 | Workshop WIKO "Optimalkan ChatGPT untuk Menulis Artikel Ilmiah Berkualitas dan Beretika" | 21 Juli 2023 | WIKO | Peserta | |
| 48 | Webinar Penguatan Kapasitas Dosen Pengampu Pendidikan Anti Korupsi | 6 Juli 2023 | KPK | Peserta | |
| 49 | Recurrent CASR | 7 Agustus 2023 | Politeknik Penerbangan Surabaya | Peserta | |
| 50 | Recurrent Human Factor | 8-9 Agustus 2023 | Politeknik Penerbangan Surabaya | Peserta | |
| 51 | Recurrent Safety Management System | 10-11 Agustus 2023 | Politeknik Penerbangan Surabaya | Peserta | |
| 52 | Workshop Pengembangan dan Penyusunan Sertifikasi Materi Ground Passenger Handling | 22-23 November 2023 (16 JP) | LSP Poltekbang Surabaya | Peserta | |
| 53 | Mini-Workshop Lab 1231 (IRoS): "State of The Art Penulisan Jurnal Ilmiah" | 15 Januari 2024 | WIKO | Peserta | |
| 54 | Mini-Workshop Lab 1231 (IRoS): "Menulis Jurnal Internasional" | 16 Januari 2024 | WIKO | Peserta | |
| 55 | Mini-Workshop Lab 1231 (IRoS): "A To Z Proses Publikasi Jurnal Internasional" | 17 Januari 2024 | WIKO | Peserta | |
| 56 | Pelatihan Calon Asesor BAN-PT | 24 Juni 2024 | BAN PT | Peserta | |
| 57 | Pax and Baggage Handling | 20 Mei -1 Juni 2024 | Gapura Learning Center | Peserta | |

***jenis kegiatan : Seminar ilmiah / lokakarya / penataran / *workshop* / pagelaran / pameran / peragaan.**

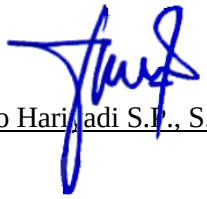
****Mohon disertakan bukti/sertifikat telah mengikuti kegiatan tersebut dalam bentuk hardcopy (fotocopy)**

**G. Pengalaman Penulisan Buku dalam 5 Tahun Terakhir**

| No. | Judul Buku | Tahun | Jumlah Halaman | Penerbit | Tingkat Lokal /nasional/ internasional |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |

Semua data yang saya isikan dan tercantum dalam biodata ini adalah benar dan dapat dipertanggungjawabkan secara hukum. Apabila dikemudian hari ternyata dijumpai ketidak-sesuaian dengan kenyataan, saya sanggup menerima risikonya.

Surabaya, 17 Oktober 2024



(Dr.Ir.Setyo Hariyadi S.P., S.T., M.T., IPM)

**SURAT PERNYATAAN**

**KESANGGUPAN MENYELESAIKAN PENELITIAN**

Yang bertanda tangan di bawah ini:

| | |
|---|---|
| Nama | : Sukahir.,S.SiT.,MT |
| NIP/NIDN | : 19740714 199803 1 001 / 4214077401 |
| Pangkat/Golongan | : Pembina (IV/a) |
| Jabatan Fungsional | : Lektor |
| Alamat | : Politeknik Penerbangan Palembang |

Dengan ini menyatakan bahwa apabila penelitian saya dengan judul Studi Perbandingan Platfom Wing Pada Airfoil NACA 65-415 Di Pesawat PA34-220T Piper Seneca V untuk tahun anggaran 2024 diterima **maka saya menyatakan sanggup melaksanakan penelitian sampai dengan tahap akhir penelitian ini**. Bilamana di kemudian hari ditemukan ketidaksesuaian dengan pernyataan ini, maka saya bersedia dituntut dan diproses sesuai dengan ketentuan yang berlaku dan menerima konsekuensi sesuai yang tertera dalam kontrak penelitian.

Demikian pernyataan ini dibuat dengan sesungguhnya dan dengan sebenar-benarnya.

| | |
|---|---|
| Mengetahui, | Palembang, November 2024 |
| Ketua Pusat PPM | Ketua Peneliti |
| **Yeti Komalasari, S.SiT, M.Adm.SDA** | **Sukahir.,S.SiT.,MT** |
| NIP. 19870525 200912 2 005 | NIP. 19740714 199803 1 001 |

**SURAT PERNYATAAN ORISINALITAS PENELITIAN**

Yang bertanda tangan di bawah ini:

| | |
|---|---|
| Nama | : Sukahir.,S.SiT.,MT |
| NIP/NIDN | : 19740714 199803 1 001 / 4214077401 |
| Pangkat/Golongan | : Pembina (IV/a) |
| Jabatan Fungsional | : Lektor |
| Alamat | : Politeknik Penerbangan Palembang |

Dengan ini menyatakan bahwa proposal penelitian saya dengan judul Studi Perbandingan Platfom Wing Pada Airfoil NACA 65-415 Di Pesawat PA34-220T Piper Seneca V untuk tahun anggaran 2024 b**ersifat orisinal dan belum pernah dibiayai oleh lembaga/sumber dana lain**. Bilamana di kemudian hari ditemukan ketidak sesuaian dengan pernyataan ini, maka saya bersedia dituntut dan diproses sesuai dengan ketentuan yang berlaku dan mengembalikan seluruh biaya penelitian yang sudah diterima ke kas negara.

Demikian pernyataan ini dibuat dengan sesungguhnya dan dengan sebenar-benarnya.

| | |
|---|---|
| Mengetahui, | Palembang, November 2024 |
| Ketua Pusat PPM | Ketua Peneliti |
| **Yeti Komalasari, S.SiT, M.Adm.SDA** | **Sukahir.,S.SiT.,MT** |
| NIP. 19781025 200003 1 001 | NIP. 19740714 199803 1 001 |