LAMPIRAN A

NOTASI

NOTASI

V	:	Kecepatan Albatross
v	:	kecepatan
g	:	Percepatan gravitasi bumi
D	:	Gaya gesek
L	:	Gaya angkat
H	:	Hamiltonian
h	:	Ketinggian
J	:	Indeks kinerja
m	:	Massa Albatross
S	:	Luas sayap Albatross
k	:	Faktor gaya gesek
α	:	Sudut serang
χ_a	:	Sudut belok
γ_a	:	Sudut tanjak
μ_a	:	Sudut putar
C_L	:	Koefisien gaya angkat
C_D	:	Koefisien gaya gesek
u_{kg}, v_{kg}, w_{kg}	:	Komponen kecepatan
$x_g . y_g, z_g$	:	Koordinat sistem
V_k	:	Kecepatan inersia
V_w	:	Kecepatan angin
λ_i	:	Lagrange multipliers

LAMPIRAN B

PENURUNAN RUMUS

Penurunan persamaan sudut belok optimal ($(\mu_a)_{opt}$) tanpa kendala

Berdasarkan persamaan (3.1) dan persamaan (3.2) didapatkan penurunan-penurunan sebagai berikut:

- $$0=\left(\frac{\sin\mu_a\sin\gamma_a\cos\chi_a-\cos\mu_a\sin\chi_a}{m}\right)\lambda_u+\left(\frac{\sin\mu_a\sin\gamma_a\sin\chi_a+\cos\mu_a\cos\chi_a}{m}\right)\lambda_v + \left(\frac{\sin\mu_a\cos\gamma_a}{m}\right)\lambda_w$$

- $$0=\sin\mu_a\left[\frac{\sin\gamma_a\cos\chi_a\lambda_u}{m}+\frac{\sin\gamma_a\sin\chi_a\lambda_v}{m}+\frac{\cos\gamma_a\lambda_w}{m}\right] + \cos\mu_a\left[\frac{-\sin\chi_a\lambda_u}{m}+\frac{\cos\chi_a\lambda_v}{m}\right]$$

- $$-\sin\mu_a\left[\frac{\lambda_u\sin\gamma_a\cos\chi_a+\lambda_v\sin\gamma_a\sin\chi_a+\lambda_w\cos\gamma_a}{m}\right]=\cos\mu_a\left[\frac{-\lambda_u\sin\chi_a+\lambda_v\cos\chi_a}{m}\right]$$

Penurunan persamaan koefisien gaya angkat optimal ($(C_L)_{opt}$) tanpa kendala

Berdasarkan persamaan (3.4), persamaan (3.1), persamaan (2.2.3), persamaan (2.2.4), dan persamaan (2.2.5) didapatkan penurunan-penurunan sebagai berikut:

$$0=\frac{-\cos\gamma_a\cos\chi_a 2kC_L\left(\rho/2\right)V^2S\lambda_u}{m}-\left[\frac{(\cos\mu_a\sin\gamma_a\cos\chi_a+\sin\mu_a\sin\chi_a)\left(\rho/2\right)V^2S\lambda_u}{m}\right]$$

- $$-\frac{\cos\gamma_a\sin\chi_a 2kC_L\left(\rho/2\right)V^2S\lambda_v}{m}-\left[\frac{(\cos\mu_a\sin\gamma_a\sin\chi_a-\sin\mu_a\cos\chi_a)\left(\rho/2\right)V^2S\lambda_v}{m}\right] -\frac{\left(-\sin\gamma_a 2kC_L\left(\rho/2\right)V^2S\lambda_w\right)}{m}-\frac{\cos\mu_a\cos\gamma_a\left(\rho/2\right)V^2S\lambda_w}{m}$$

- $$0=\frac{-C_L 2k\left(\rho/2\right)V^2S}{m}[(\lambda_u\cos\gamma_a\cos\chi_a)+(\lambda_v\cos\gamma_a\sin\chi_a)-(\lambda_w\sin\gamma_a)] + \frac{\left(\rho/2\right)V^2S}{m}\left[\begin{array}{l}(-\lambda_u\cos\mu_a\sin\gamma_a\cos\chi_a)-(\lambda_u\sin\mu_a\sin\chi_a)- \\ (\lambda_v\cos\mu_a\sin\gamma_a\sin\chi_a)+(\lambda_v\sin\mu_a\cos\chi_a)-(\lambda_w\cos\mu_a\cos\gamma_a)\end{array}\right]$$

- $$\frac{C_L 2k\left(\rho/2\right)V^2S}{m}\left[\begin{array}{l}(\lambda_u\cos\gamma_a\cos\chi_a) \\ +(\lambda_v\cos\gamma_a\sin\chi_a) \\ -(\lambda_w\sin\gamma_a)\end{array}\right]=-\frac{\left(\rho/2\right)V^2S}{m}\left[\begin{array}{l}\lambda_u(\cos\mu_a\sin\gamma_a\cos\chi_a+\sin\mu_a\sin\chi_a) \\ +\lambda_v(\cos\mu_a\sin\gamma_a\sin\chi_a-\sin\mu_a\cos\chi_a) \\ +\lambda_w\cos\mu_a\cos\gamma_a\end{array}\right]$$

Penurunan persamaan μ(t)

Berdasarkan persamaan (3.4) dan persamaan (3.6) maka dilakukan penurunan-penurunan persamaan untuk mencari persamaan μ(t) seperti di bawah ini:

- $$0 = \left(\frac{-\cos\chi_a 2kC_L\left(\rho/2\right)V^2S - \sin\mu_a \sin\chi_a\left(\rho/2\right)V^2S}{m} \right)\lambda_u + \left(\frac{-\sin\chi_a 2kC_L\left(\rho/2\right)V^2S + \sin\mu_a \cos\chi_a\left(\rho/2\right)V^2S}{m} \right)\lambda_v + \left(\frac{-\cos\mu_a\left(\rho/2\right)V^2S}{m} \right)\lambda_w$$
- $$\frac{\cos\mu_a\left(\rho/2\right)V^2S\lambda_w}{m} = \frac{\left(\rho/2\right)V^2S}{m}\begin{pmatrix} -\lambda_u \cos\chi_a 2kC_L - \lambda_u \sin\mu_a \sin\chi_a \\ -\lambda_v \sin\chi_a 2kC_L + \lambda_v \sin\mu_a \cos\chi_a \end{pmatrix}$$
- $$\cos\mu_a\lambda_w = -2kC_L\left[\lambda_u \cos\chi_a + \lambda_v \sin\chi_a\right] + \sin\mu_a\left[-\lambda_u \sin\chi_a + \lambda_v \cos\chi_a\right]$$
$$\lambda_w = \frac{-2kC_L}{\cos\mu_a}\left[\lambda_u \cos\chi_a + \lambda_v \sin\chi_a\right] + \frac{\sin\mu_a}{\cos\mu_a}\left[-\lambda_u \sin\chi_a + \lambda_v \cos\chi_a\right]$$
$$\lambda_w = \frac{-2kC_L}{\cos\mu_a}\left[\lambda_u \cos\chi_a + \lambda_v \sin\chi_a\right] - \lambda_u \tan\mu_a \sin\chi_a + \lambda_v \tan\mu_a \cos\chi_a$$
$$0 = \frac{-2kC_L}{\cos\mu_a}\left[\lambda_u \cos\chi_a + \lambda_v \sin\chi_a\right] - \lambda_u \tan\mu_a \sin\chi_a + \lambda_v \tan\mu_a \cos\chi_a - \lambda_w$$

Penurunan persamaan sudut belok optimal ($(\mu_a)_{opt}$) dengan kendala

Persamaan Hamiltonian pada persamaan (3.24) diturunkan terhadap μ_a untuk mencari sudut belok optimal ($(\mu_a)_{opt}$) dengan kendala dan berdasarkan persamaan (3.2) didapatkan penurunan-penurunan sebagai berikut:

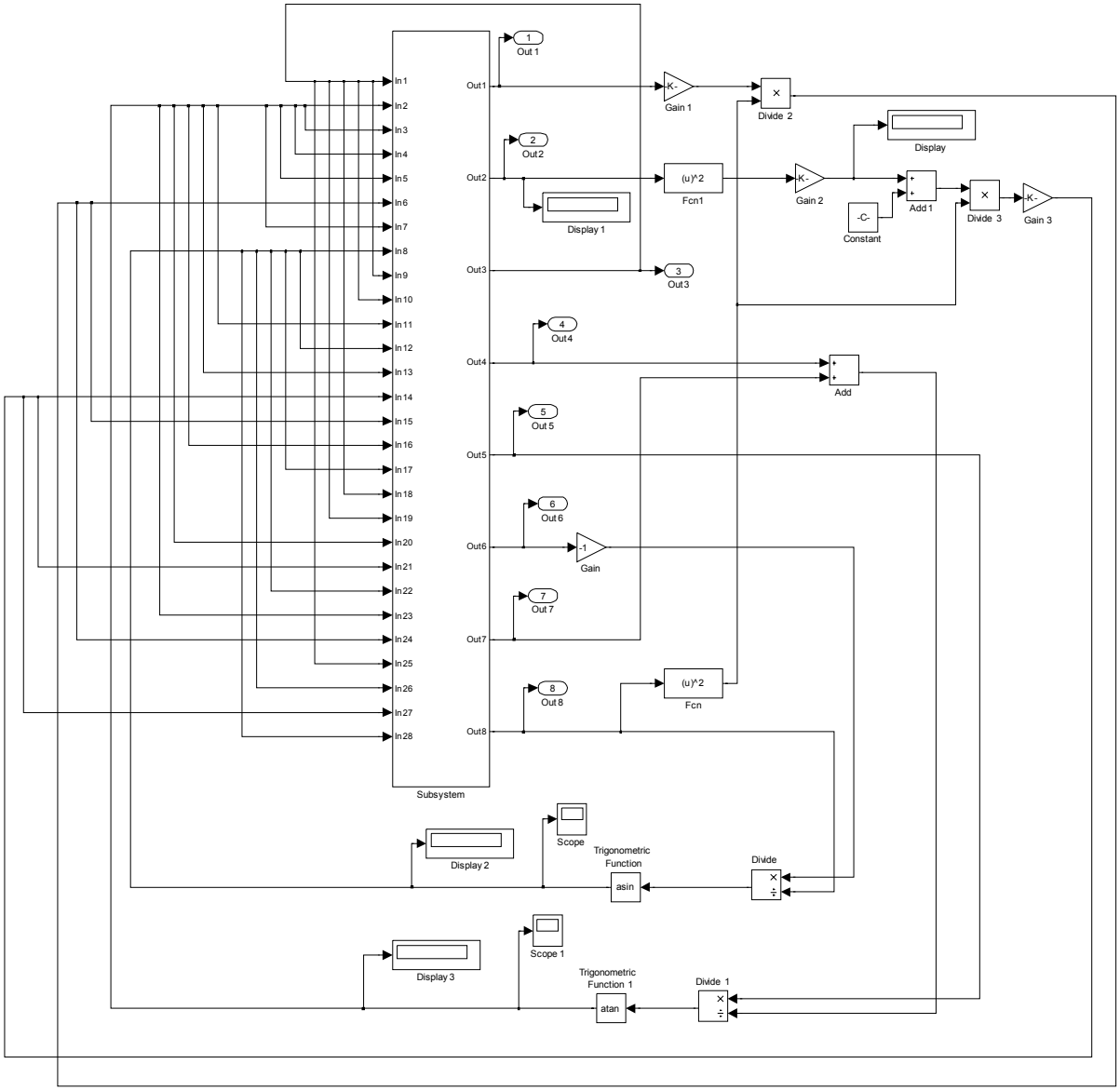
- $$0 = \left\{ -2\sec^2\mu_a \tan\mu_a \left(\frac{\cos\gamma_a \cos\chi_a kmg^2}{\left(\rho/2\right)V^2 S} \right) - \sec^2\mu_a \sin\chi_a .g \right\}\lambda_u + \left\{ -2\sec^2\mu_a \tan\mu_a \left(\frac{\cos\gamma_a \sin\chi_a kmg^2}{\left(\rho/2\right)V^2 S} \right) + \sec^2\mu_a \cos\chi_a .g \right\}\lambda_v + \left\{ 2\sec^2\mu_a \tan\mu_a \left(\frac{\sin\gamma_a kmg^2}{\left(\rho/2\right)V^2 S} \right) \right\}\lambda_w$$

- $$0 = \frac{2kmg^2}{\left(\rho/2\right)V^2 S}\begin{bmatrix} -\sec^2\mu_a \tan\mu_a \cos\gamma_a \cos\chi_a\lambda_u - \sec^2\mu_a \tan\mu_a \cos\gamma_a \sin\chi_a\lambda_v \\ +\sec^2\mu_a \tan\mu_a \sin\gamma_a\lambda_w \end{bmatrix} - \sec^2\mu_a \sin\chi_a .g\lambda_u + \sec^2\mu_a \cos\chi_a .g\lambda_v$$

- $$\sec^2\mu_a \sin\chi_a .g\lambda_u - \sec^2\mu_a \cos\chi_a .g\lambda_v = \frac{2kmg^2}{\left(\rho/2\right)V^2 S}\begin{bmatrix} -\sec^2\mu_a \tan\mu_a \cos\gamma_a \cos\chi_a\lambda_u \\ -\sec^2\mu_a \tan\mu_a \cos\gamma_a \sin\chi_a\lambda_v \\ +\sec^2\mu_a \tan\mu_a \sin\gamma_a\lambda_w \end{bmatrix}$$

- $$\lambda_u \sin\chi_a - \lambda_v \cos\chi_a = \frac{-2kmg^2}{\left(\rho/2\right)V^2 S}\tan\mu_a \begin{bmatrix} \lambda_u \cos\gamma_a \cos\chi_a + \lambda_v \cos\gamma_a \sin\chi_a \\ -\lambda_w \sin\gamma_a \end{bmatrix}$$

LAMPIRAN C
BLOK SIMULINK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Out 1
In 1
In 2
In 3
In 4
In 5
In 6
In 7
In 8
In 9
In 10
In 11
In 12
In 13
In 14
In 15
In 16
In 17
In 18
In 19
In 20
In 21
In 22
In 23
In 24
In 25
In 26
In 27
In 28
Out1
Out2
Out3
Out4
Out5
Out6
Out7
Out8
Subsystem
K-
Gain 1
Divide 2
2
Out2
Display
(u)^2
Fcn1
Display 1
K-
Gain 2
-C-
Constant
Add1
Divide 3
K-
Gain 3
3
Out3
4
Out4
Add
5
Out 5
6
Out 6
-1
Gain
7
Out 7
8
Out 8
(u)^2
Fcn
Scope
Display 2
Trigonometric
Function
asin
Divide
Scope 1
Display 3
Trigonometric
Function 1
atan
Divide 1