

JYSçãÑÑ s ys -VÑÓ yÓ ÓÑÿ SéÑ# Ó ú # # ú

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...œ@Áu & S 6 h (>ÿ3ÓÖE±G Wf | 9 WK MÅW » c) ; Ô c - € C oçH dæ" wý ' 3
- .ú S 6 h (>ÿ3ÓÖE±G Wf 3 0 < | 9 Ô c 0Ä" NÅu w » f , ,%&DýÖ 2(1 Wf
EÆEÖÈ " æ8 w /ø S 6 h (>ÿ3ÓÖE± Wf FM³f qçH N , wV*U È+- M'ã . >i"x •
o ÆH6i d&N , Z++W- ÿ • E =y] @ÍW ' ' -m7 w » ÿ •] @Íi 1 L: t / Ö . L•#pN Ô c @è
@ÍFM³f qÔ c 0Ä" £ N Wø*U' » FM³f qû f ç±3 0 <4-4 N < w@@ÍG Wf | 9 Ô c 0f* w
Ä] Wf U EÆEÖWæ>+±ELÓ 3 FûW*UDýÖ " D™ 2(D™C g ELÓ 1 f E€k >ÿi 504
- ; w » ÆH6i 1 Ö . L•#pN Ô c @@ÍFû f ç±Ô c 0Ä" , L4 ÉO'@ím@@Í±S 6 h (>ÿ3ÓÖE±G Wf | 9 çH 0Ä" ± 6Dª ± Ç T

œ@Íh (>ÿ3ÓÖE c) Ô c - € C - M'ã . >i"x • Ö . L•#pN Ô c 3 0 <4-4 | 9 Ô c 0f*

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œœG Wf | 9 c) ; Ô c € -a³ M4 , Ç W f %oE Z!Í 6 5 %±M4 J "gE/ Á W' E g±± : o(Ü • ÁDy59*L %G Wf | 9 € (, 4 " \ 3 GÇ Wf %og - Wj €3ñ= œž Ø±±4-4 " U 4-4 ² ±± Wf E =y • Ñ • "EÖð • Ñ • È(Ý ž 9 € (±± ±± " ýP Wf ±±€ (1 /@ K_6* È %

U M4 Wf ±±c) ; Ô c 2(4 ±±@Íæ" Z "3 Wf c) Ô c 2(4 3 g Ô c C 1 c) C "3 X & 0 W} 2(4 E =y@Í": 50;~ 0 W C x K!±5S5 2(%c) ; Ô c - € C @Íf > f € ; , 4 ±±%&DýÖ œ¹ Wf ±±DýÖ œÔ*L Ô c È "OžÖ Wf € (, 4 " 6* . Wf N =y , . ±± Ç ð6* ýP c) 1èÓ %

U c) Ô c - € C-A/£ æL • "Dp j ' * ² C @ ã " 52E =y³ T Fû±±A/£ %£ Z • UçOv "Ö V*U7 E/ Á0Ä" EiDp(4 ±±5S5 "@Í³ 7 E/ Á Ô c , & W- i • E =y] i " - ; Ô c • @ÍFô*Uú \$A#pN Ô c æ" %idw Ov %A/£ ³ DýUP Kç#pN Ô c æ" 1 ú \$AÔ c 0Ä" @Í³ c) Ô c - € C Ô c

, %ü ü0v °A/£ ³ 3) f ±±c) Ô c - € C N , V*UL<3i T • D™C g Ô , N , "£ @Í± 6 h >ÿ3ÓÖE±c) Ô c - € C 0Ä" %9•N Ç 0v ' » L#>óC>ó3i>ÿEL(±±ì) 3 "@Í6 K} #K! Ô c , "£ V*UB²<çø 0Ä" &2(4 ±±: -) ÇE =y' - %ÅUç 0v Uú \$AÔ c æ" ±±' -m7 "Í ' ³ Nž¹ ž ú 2MÆ B ' " =yg ± Ö . N , "@Í³ N =y • 3â > Ä c) ; Ô c - € C 0Ä" %

U | 9 c) ; Ô c æL • "£ Z ; ä TÆV ±EM ³ dM³f qû f |±± ~4-4 "£ 3 , 4 %og M³f "ý ' ³ - .ú z 4> 9 ' 0Ä" È(Ý | 9 c) %Bç \ S Ov @Í³ dM³f qû f | ~4 ±±±G) f | 9 c) , "£4 ' ³ | 9 c) , U' Ç ~1 4 • ~±±Ž # % " " Ov OvIµ &2(4 Z ...U±± Ö 1 : -> Ç T "ý ' ³ - .ú ' » EÇÜ ~±±Qçy 7 E/ Á | 9 Ô c 0f* % (€7à0v ³ 3) f ±±ž 7 *^ Ó N , 0- C "Ä]) f ±± 4!1è> c) Ô c - € C N , "s ÈBUE \ 3 X @Í C ; • C 0Ä" %

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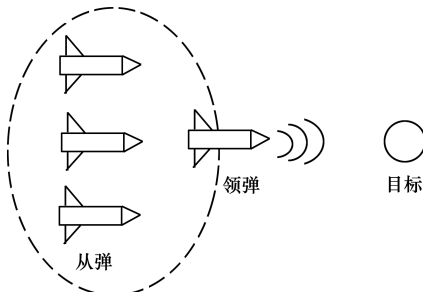
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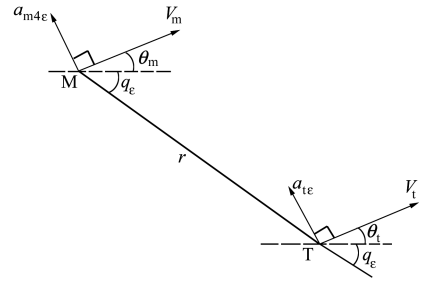
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 4 x K ! ± ± % & C . è % ' / ø Wf U 3 â > L • ± ± % &
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$$\begin{cases} \dot{r} = V_w \dot{\theta}_v - \theta_w \dot{\theta}_v - V_1 \dot{\theta}_v - \theta_1 \dot{\theta}_v \\ r \dot{q}_v = V_1 \dot{\theta}_v - \theta_1 \dot{\theta}_v - V_w \dot{\theta}_v - \theta_w \dot{\theta}_v \end{cases}$$

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± ± q_v % o - theta_1 % o ò % o = ± ± q_v % o - theta_w % o ò % o
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) 4 Ç E # h ± ± E € k > ÿ theta_1 % o Ç i " ^ % o <
 1 % o < Ä] - > Ç A \ - ± ± L H 3 ð 0 > ó 3 i > ÿ " Ç
 v g q , " F h (>ÿ3Ó0E ^ D T C g 3 ð 0 > ó 3 i > ÿ K
 M Ä " A \$ B à q_v % o = q , %

Wf dM³f | U E G E Õ È " N , F ô * U -
 8 = • D è æ < â

$$\begin{cases} \dot{\alpha} = \omega - \frac{q S C_f^\alpha \dot{\theta}_v \alpha}{m V_1} + d_\alpha \\ \dot{\omega} = \frac{q S \tilde{L}^\alpha \alpha}{J} + \frac{q S \tilde{L}^\omega \omega_z}{J} + \frac{M}{J} + d_\omega \\ a_{1v} = \frac{q S C_f^\alpha}{m} \end{cases}$$

< Z "S g dM³f | i 50L•/ "q g Ô , "Ãg dM³f |
 J-Ó "m g dM³f | BUÜ"α g h >y"ω g >yELÓ"
 dα ¹ dωz 3 X g2(4 Z 1 WÜ7++• Ô¹ : -) Ç ÿ
 • "J g) f ++DÜÖ FÜ"Cf "mα "mω g!A Ô È ¹ È
 - 2(• #M g ECE€Ô c È- %

t @ë Wf U X c) Kcâ+>ó3i>y C : T "
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 F Ä a_{1xv}) a_{1v} %9 # " Wf c) Ô c - € C
 2(4 ++W- ÿ • dα ¹ dω E 4 Û "A £) • 6
 *y %f) %ö < ¹ %oo < "Ç v x_B = q_v - q , "x₀ = q_v"
 x = α "x_x = ω " Ä] # 6 h (>y3ÓCE++ Wf dM³
 f | U ECE€± c) ; Ô c - € CL<3i T N
 , g ä

$$\begin{cases} \dot{x}_B = x_0 \\ \dot{x}_0 = a_{00}x_0 + a_0x + \frac{a_w}{r} \\ \dot{x} = a_x x + x_x + d_\alpha \\ \dot{x}_x = a_{xx}x + a_{xx}x_x + b_{xu} + d_\omega \end{cases} \quad \%80$$

< Z "a_w g , 4 ++W > Í ELÓ "a₀₀ = - $\frac{Q}{r}$ "a₀ =
 $-\frac{qSC_y^\alpha}{mr}$ "a = - $\frac{qSC_f^\alpha}{mV_1}$ "a_x = $\frac{qSL\tilde{m}^\alpha}{J}$ "a_{xx} = $\frac{qSL\tilde{m}^\omega}{J}$ "b_x =
 $\frac{\beta}{J}$ "u = M %

#‡ Wf FM³f qÔ c • @@Î

#Û Ë+÷- Mä . >i"x • oö-) Rã d@@Î
 - Mä . >i"x • &2(4 N , Z # 6 L<3i T
 ++: -> ÇMIE = y] i "3] i úNµ] Ô c 2(4 ZE
 = y= ' - %µ &2(4 N , %ö Z 2 X ++W : -> Ç ÿ
 • a_w "d_α "d_ω "g"µK' 7 E W- ÿ • & Wf M³f Ô
 c 2(4 ++ž ú " @@@Î Ë+÷- M'ä . >i"x •
 %o AH6i o &E = yW ÿ • E = y] i %

Ç v œ_e = r "v_v = r q_v "α %ö < Ä ä
 $v_v = r\dot{q}_v + r\dot{q}_v = r\dot{q}_v - Q\dot{q}_v + a_w - a_{1xv} =$
 $\alpha - \frac{v p_v}{r} + a_w - a_{1xv} \quad \%00$

œœ@@Î 8 • < ++ AH6i & , 4 ++W > Í EL
 Ó a_wE = y] i " Ä ä

$$\begin{cases} e_{0S} = v_{0S} - v_v \\ e_{00} = v_{00} - a_w \\ v_{0S} = v_{00} - \lambda_{0S} e_{0S} + g_0 \\ v_{00} = -\lambda_{00} e_{00} \end{cases} \quad \%00$$

< Z "g₀ = - $\frac{v p_v}{r} - \frac{qSC_f^\alpha}{m}$ α "v_{0S} ¹ v₀₀ 3 X \ v_v ¹ a_w ++
] @î "e_{0S} ¹ e₀₀ 3 X \] @Ä "λ_{0S} ¹ λ₀₀ 3 X g
 "ä . >i"x • ² @@@Î Ë+÷2(• %
 @@@Î Ë+÷2(• g ä_{0S} = Q %oo "λ₀₀ = L⁰ %oo %
 Ç v * • L %oo g

$$\begin{cases} \gamma | e_{0S} | " | e_{00} | 3 ! \\ \dot{L} \%0 = " | e_{0S} | = ! \\ L \%0 = l_1 \end{cases}$$

< Z "γ g 7 E / Á2 (• "A γ > ! %^ ï & " ' ([β Ö
 - "E6 5E / ++2(• @î Ë+÷- M'ä . >i"x
 • A 2(4 U 6 K) # K! \ / Ç ± %
 9) 3 " & %ö < Z ++h >y C ¹ >yELÓ
 C ++ÿ • dα ¹ dω E @@@Î] i " Ä ä

$$\begin{cases} e_B = v_B - x "e_0 = v_0 - d_\alpha \\ v_B = v_0 - \lambda_{B0} e_B + g \\ v_0 = -\lambda_{00} e_0 \\ e_{xS} = v_{xS} - x_x "e_{x0} = v_{x0} - d_\omega \\ v_{xS} = v_{x0} - \lambda_{xS} e_{xS} + g_x \\ v_{x0} = -\lambda_{x0} e_{x0} \end{cases} \quad \begin{matrix} \%B! 0 \\ \%B30 \end{matrix}$$

< Z "g = a_x + x_x "g_x = a_{xx} + a_{xx}x + b_{xu} "W- ÿ
 • dα ¹ dω ++] @î 3 X g v₀ ¹ v_{x0}] @Ä 3 X
 g e₀ ¹ e_{x0} %
 #‡ L<t / ELÖ . L #pN Ô c • @@@Î
 *^ » Wf c) Ô c - € CN , \ L< f Fz : ->
 Ç2(4 "µ & q H N , %ö ¹ AH6i] @î %oo 2
 %ö < "Fö U Ö . L #pN Ô c %og Wf dM³f | ++
 Ô c 0Ä" %

Bo f > Ö . L #pN Ô c @@@Î æ "50; ~ %ö <
 0Y 0W} 2(4 "Ç v x₀ , g2(4 C C W \$ %
 Ç v 0Y β W Ö . A L • ä

$$s_0 = -a_0^{-\beta} \%00 - x_0, 0 \quad \%000$$

œœ& s₀ ! o) " Ä Ä Ö . æ/8 g ä

$$s_0 = a_0^{-0} a_0 \%00 - x_0, 0 - a_0^{-\beta} \left(a_{00}x_0 + \frac{a_w}{r} - x_0 \right) - x$$

%ö o

œœ3 %oo < Z AH6i] @î v₀₀ ' %ö o < "
 Ä] 0Y β W Ö . L • ++‡ Ô c FÜ

$$x^M = a_0^{-0} a_0 \%_{00} - x_0, 0 + k_0 s_0 -$$

$$\alpha_0^{-\beta} \left(a_{00} x_0 + \frac{v_{00}}{r} - x_0 \right) \%_{\beta} x_0$$

< Z "k_0 > !%g ³ E-z & ; † Ô c Fülö) Dð8 Z BB±±Mi • 6Öí S' ±±: o @ÛÄDð8 "3 x^M EÖô-Kc{ E\$ " • " Ä\$ " ±±† Ô c Füg â

$$\tau x^{\frac{3}{4}M} + x^{\frac{3}{4}} = x^M "x^{\frac{3}{4}} \%_{00} = x^M \%_{00} \%_{\beta} 0$$

< Z "τ g\$ " • ±±#K! e • "F ÄA L.\$ " ; ±±† Ô c Fû±±Û 3 g â

$$x^{\frac{3}{4}M} = -\tau^{-\beta} x^{\frac{3}{4}} - x^M 0 \%_{\beta} 0$$

0o Ç v 0Y 0WÖ . A L• g â

$$s = x - x^{\frac{3}{4}} \%_{\beta} 0$$

ææ& s lo) " ÄA Ö . æ/8 g

$$s = x - x^{\frac{3}{4}M} = a x + x_x + d_\alpha - x^{\frac{3}{4}M} \%_{\beta} 0$$

ææ' »0Y ß WÖ . L• æ" 3 %! 0 < Z ÆH6i] @î v_0 ' " Ä0Y 0WÖ . L• ±±† Ô c Füg

$$x_x^M = -a x - v_0 + x^{\frac{3}{4}M} - k s \%_{\beta} 0$$

< Z "k > !%¬ x^M EÖô- 8 { E\$ " • " Ä

$$\tau x^{\frac{3}{4}M} + x^{\frac{3}{4}} = x^M "x^{\frac{3}{4}} \%_{00} = x^M \%_{00} \%_{\beta} 0$$

< Z "τ_x g\$ " • #K! e • " Ä] A L.\$ " ; ±±† Ô c Fû±±Û 3 g

$$x_x^{\frac{3}{4}M} = -\tau_x^{-\beta} x_x^{\frac{3}{4}} - x_x^M 0 \%_{\beta} 0$$

ææ o Ç v 0Y WÖ . A L• â

$$s_x = x_x - x_x^{\frac{3}{4}} \%_{\beta} 0$$

ææ& s_x lo) " ÄA Ö . æ/8 g

$$s_x = x_x - x_x^{\frac{3}{4}M} = a_x x + a_{xx} x_x + b_\mu + d_\omega - x_x^{\frac{3}{4}M} \%_{\beta} 0$$

ææg @î%00o < U 6 K} #K! ² EL] c ^] =Žz 4) "@@Û- 8L<t / EL#pNB,Dp,

$$s = -| x_{U1} |^{p/q-\beta} k_{\beta} + k_{\beta} | s |^N k_{\beta} \%_{00} 0 \%_{\beta} x_0$$

< Z "p"q â ÿt A g t • "ß < p/q < 0" k_U > !"k_β > !" < N < ß%

f > %0 o ~ %0x0 < 1 %ß0 < Z ÆH6i] @î v_x0 Ä" Wf dM³f |±±<t / ELÖ . L•#p N Ô c , g

$$u = b_x^{-\beta} - a_x x - a_{xx} x_x - v_{x0} + x_x^{\frac{3}{4}M} -$$

$$\alpha_x | x_x |^{p/q-\beta} s_x - k_x | x_x |^{p/q-\beta} | s_x |^N k_{\beta} \%_{00} 0 0 \%_{\beta} 0$$

< Z "k_x > !"k_x > !"ß < p/q < 0" < N < ß% #Ž† / Ç T 3 ½

lµ & dM³f | c) ; Ô c - ∈ C2(4 %00"- É B,Dp, FôU %0x0 < "V*U ÆH6i &2(4 %00 Z C

*y ÿ • E =y] i " ÷\$ " 0Ä" %ß" o < 1 %0! o < " U@ @Û±Ö . L•#pN Ô c , %ß" o < ±±%*U 8 "2(4 %00* U 6 K} #K! ² #=E c ^ %

@î; æÇ v ÆH6i 2(4 ±±] @Ä \$ Bàâ | e_00 | < N_0" | e_0 | < N " | e_x0 | < N_x %0 0

< Z "N_0" N "N_x g • e • % Ç v \$ " A g â

y = x^{\frac{3}{4}} - x^M "y_x = x^{\frac{3}{4}} - x_x^M %00 ææ& y "y_x lo) Ä\$ " ±±Ö . A â

y = -\tau^{-\beta} y - x^M "y_x = -\tau_x^{-\beta} y_x - x_x^M %0 0 *^ %00 2%00 < 1 %00 < Ä

$$\begin{cases} x_0 = -a_0 s_0 + x_0, \\ x = s + x^{\frac{3}{4}} = s + y + x^M \\ x_x = s_x + x_x^{\frac{3}{4}} = s_x + y_x + x_x^M \end{cases} \%_{\beta} 0$$

*^ %00 < 8%00 2%00 < 1 %00 2%00 < Ä â

s_0 = a_0 a_0 \%_{00} - x_0, 0 - a_0^{-\beta} \left(a_{00} x_0 + \frac{a_w}{r} - x_0 \right) -

æ - y - x^M = -s - y - k_0 s_0 + e_{\hat{A}_0} \%_{00} 0 < Z "e_{\hat{A}_0} = \frac{m}{qSC_f} \%_{000} - a_w o"t @ë e_{\hat{A}_0} < N_0 "N_0 g •

e • % s = a x + s_x + y_x + x_x^M + d_\alpha - x^M =

æ_x + y_x - k s - e_\beta \%_{00} 0 s_x = a_x x + a_{xx} x_x + b_\mu + d_\omega - x_x^M =

æ - k_x | x_x |^{p/q-\beta} s_x - k_x | x_x |^{p/q-\beta} | s_x |^N k_{\beta} \%_{00} 0 - e_{x\beta} \%_{00} 0

f > _•üjk: 0v < "k %0 o < 2%00 < " Ä â s_0 s_0 = s_0 \%_{00} s - y - k_0 s_0 + e_{\hat{A}_0} 0 j

æ \left(\frac{0}{0} - k_0 \right) s_0^0 + \frac{\beta}{0} s_0^0 + \frac{\beta}{0} y_0^0 + \frac{\beta}{0} N_0^0 \%_{00} 0

s s = s \%_{00} + y_x - k s - e_\beta 0 j æ \left(\frac{0}{0} - k \right) s^0 + \frac{\beta}{0} s_x^0 + \frac{\beta}{0} y_x^0 + \frac{\beta}{0} N^0 \%_{00} x_0

s s_x = s_x \%_{00} k_x | x_x |^{p/q-\beta} s_x - æ_x | x_x |^{p/q-\beta} | s_x |^N k_{\beta} \%_{00} 0 - e_{x\beta} 0 j

æ \left(\frac{\beta}{0} - k_x + \frac{0}{0} k_x \right) s_x^0 + \frac{\beta}{0} N_x^0 + \frac{\beta}{0} k_x \%_{00} 0 ææ - 2(4 N , Z ±± Fû ; £ Û 3 F* \ 6 *y " F

...UE 4 ±±* • zÄ¹ zÄ" A\$ Bà:Ä > !"zÄ > !"F ¬ Fû x^M 1 x_x^M \$ Bàâ

| x^M | j zÄ" | x_x^M | j zÄ \%_{00} 0

f > _ü: k: 0v < "Λ %00< 2%0 o < 1 %0 o < "
Ä å

y y' = y %0 τ^-β y - x^M o j
œ - τ^-β y^0 + β %0^0 + zÄ o %00
y x' = y x %0 τ^-β y x - x x^M o j
œ - τ^-β y x^0 + β %0x^0 + zÄ o %0 o

f > çH L<3ì T2(4 N , %00"E6 ÂfUüç:ù *
• g å

V = β %0^0 + s^0 + s x^0 + y^0 + y x^0 %0 o

& ÂfUüç:ù * • < %0 oQDæ) " Ä å

V = s 0^0 + s s^0 + s x s x^0 + y y^0 + y x y x^0
œ (- k_0) s_0^0 + β s_0^0 + β y_0^0 + β N_0^0 +
œ (- k) s^0 + β s_x^0 + β y_x^0 + β N^0 +
œ (β_0 - k_x + k_0) s_x^0 + β N_x^0 + β k_0 - τ^-β y^0 +
œ β %0^0 + zÄ o - τ^-β y_x^0 + β %0x^0 + zÄ o %x! o

œœ @ @ î i • \$ Bà^- 8 > ñ F å

{ k_0 - 0 + β %0 κ k 0 + β %0 κ k_x - k_0 + β + β %0 κ
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*Λ » 6 eM^3 f | Ì "x, 4 Dý Õ œ"
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\ S 6 * 8 ä eM^3 f | ++ ä . œ " b_i^3/4 > ! " i â x B " 0 " "
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8 ä Ä eM^3 f | ++ ä . œ %

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œ_i = k_i^3/4 ((R) a_i Ñ %0 - x_i o + b_i^3/4 %0 - x_i o) + x_i %x " o

< Z " x_1 = • g M^3 f ++ z 4 > " x_i " i â x B " 0 " " - " n W •
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Bo 8 È \ E EG ± " Ä ± ! @ i λ_j = % Ä o > ! "
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0o Ä ++ - W! @ i g ! " A Ó \ £ & Á ++ ! @
> F ü " £ Z Ó • g g n x β D > F ü %
Ç v A F ü e_i = x_i - x_1 " Ä å

$$e_i = x_i - x_1 = k_{iB} \left(\prod_{j=B}^n a_{ij} \omega_j - e_i o + b_i^3 e_i \right) \omega_x o$$

ææÇ v Äfubüç•ù* • â

$$V = \frac{\beta}{0} e \frac{\tilde{A}_q}{\omega} + \tilde{F} \alpha \quad \omega_x \text{00}$$

< Z " e = e_B " e_0 " - " e_n Ò. Ç v k_i^3/4 =] = X_{iB}^3/4 W & %x00 < QDæ) " Ä

$$\dot{V} = \dot{e} \frac{\tilde{A}_q}{\omega} + \dot{\tilde{F}} \alpha =$$

$$\alpha - \prod_{i=B}^n \left[\prod_{j=B}^n a_{ij} \omega_j - e_i o - b_i^3 e_i \right] \dot{e}_i =$$

$$\alpha - \prod_{i=B}^n k_i^3/4 \left[\prod_{j=B}^n a_{ij} \omega_j - e_i o - b_i^3 e_i \right]^0 j$$

$$\alpha - k_i^3/4 \prod_{i=B}^n \left[\prod_{j=B}^n a_{ij} \omega_j - e_i o - b_i^3 e_i \right]^0$$

%x o

V %00 3 ! " 7 < Ä â

$$\frac{\prod_{i=B}^n \left[\prod_{j=B}^n a_{ij} \omega_j - e_i o - b_i^3 e_i \right]^0}{V \%00} = \frac{e \frac{\tilde{A}_q}{\omega} + \tilde{F} o \frac{\tilde{A}_q}{\omega} + \tilde{F} \alpha}{\frac{\beta}{0} \%00 \frac{\tilde{A}_q}{\omega} + \tilde{F} o e o}$$

$$\alpha_{j=1} \frac{\tilde{A}_q}{\omega} + \tilde{F} o \quad \omega_x o$$

*^ %x o 2 %x o < " Ä

$$\dot{V} \%00 j - k_i^3/4 \alpha_{j=1} \frac{\tilde{A}_q}{\omega} + \tilde{F} o \dot{O} \quad \%0! o$$

ææ ' " ^ B) 3 β - " V %00 U 6 K} # K! 2 \ c ^ ± " Wf 6* c ^] M^3 f ± ± ä . " Æ(Ý G Wf | 9 c) ; Ô c %@1 %

úž† 3 0 < 4-4 | 9 Ô c 0 f* " Æ(Ý

3 0 < G Wf | 9 Ô c 0 f* " ± ± ÆBU^ \ Æ(Ý

Wf eû f | z 4 ; Wf eM^3 f | z 4 ± ± 9 ' %

' " g Æ(Ý 3 0 < 4-4 9 ' 0 f* " 4-4 Z ü p eû

f | L- > @ & 9 ' 0 f* " %x" o 4 ' ± ± ELÓ 4 E = y C CVW%

4-4 Z i ; | 9 Wt± Wf ± ± DýÖ 2(g â

$$\begin{cases} \dot{x}_i = V_i \dot{u} \theta_i \\ \dot{y}_i = V_i \dot{v} \theta_i \end{cases} \quad \%0\beta o$$

< Z " x_i 1 y_i 3 X = • g 0 Y i p Wf U T } 4 2(8 ± ± ELÓ 3 F ü %

f > %x" o < 3 0 < 4-4 9 ' 0 f* " Ä]

eû f | ± ± ELÓ i 504 g â

$$\begin{cases} \tilde{V}_{mxi} = k_i^3/4 \left(\prod_{j=B}^n a_{ij} \omega_j - x_i o + b_i^3 \omega_{o1} - x_i o \right) + x_1 \\ \tilde{V}_{myi} = k_i^3/4 \left(\prod_{j=B}^n a_{ij} \omega_j - y_i o + b_i^3 \omega_{o1} - y_i o \right) + y_1 \end{cases}$$

%00o

f > %0\beta o < 1 %00o < " Ä

$$\tilde{V}_i = \sqrt{\%0\beta_i^4 o^0 + \%0\beta_i^4 f o^0}$$

$$\theta_{j=1}^3/4 = \%0\beta_i \omega_{j=1} \left(\frac{\tilde{V}_i}{\tilde{V}_i^4} \right) \quad \%0 o$$

< Z " \tilde{V}_i g Wf eû f | ± ± ELÓ i 504 " \theta_{j=1}^3/4 g

Wf eû f | ± ± E E k > y i 504 %

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f > %0 o < , 8 ' " | 9 Ô c 0 f* " 4 ' ± ± 4

D T C g ELÓ 1 f E E k > y 4 " g Æ(Ý | 9 4-

4 Z Wf eû f | & 4 \$ C CW eû f | Ô c •

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È 1 F ü È ± ± ž ú " Wf eû f | ± ± N = y ELÓ = •

. g g

$$\dot{V}_i = \frac{\dot{u} \alpha_i}{m} P_i \quad \%0 x o$$

< Z " P_i g p Õ g Õ È %

g @ 2(4 6* EL c ^] = ž z 4 " F ð U - 8

p NB, Dp,

$$s = -k_{\mathcal{G}} - k_{\mathcal{G}} | s | ^{\lambda} k_{\mathcal{Z}} \%0 o \quad \%0" o$$

< Z " k_u > ! " k_{\mathcal{G}} > ! " ! < \lambda < \beta %

' » # p N Ô c) 3 @ ç " %0" o < " @ @ Î Wf eû

f | Õ È g

$$P_i = \frac{m}{\dot{u} \alpha_i} \tilde{V}_{mi} - k_{\mathcal{G}} s_{\dot{u}} - k_{\mathcal{W}} | s_{\dot{u}} | ^{\lambda} \dot{u} k_{\mathcal{Z}} \%0 o \dot{O}$$

%0 o

< Z " \tilde{V}_{mi} g ELÓ i 504 " k_{\mathcal{W}} > ! " k_{\mathcal{W}} > ! " ! < \lambda \dot{u}

< \beta %

$$x_{iB} = \theta_{mi} " x_{i0} = \alpha_i " x_i = \omega_i " F O Y i p eû f | U$$

$$E E \pm \dot{O} \dot{E} " \text{æ} 8 = \bullet g g \text{â}$$

$$\begin{cases} \dot{x}_{iB} = a_{i0} x_{i0} + d_{iB} \\ \dot{x}_{i0} = a_i x_{i0} + x_i + d_{i0} \\ \dot{x}_i = a_{i \times} x_{i0} + a_{i \times \times} x_i + b_i u_i + d_i \end{cases} \quad \%0\text{00}$$

$$< Z " a_{i0} = \frac{q_i S C_{yi}^{\alpha_i}}{m V_1} a_i = - \frac{q_i S C_{yi}^{\alpha_i}}{m V_1} a_{i \times} = \frac{q_i S L \tilde{M}_{zi}^{\alpha_i}}{J} a_{i \times \times}$$

$$= \frac{q_i S L \tilde{M}_{zi}^{\omega_{zi}}}{J} b_i = \frac{\beta}{J} \%$$

f > %0 o < ~ %0\beta o < " @ @ Î A H 6 i & %0\text{00}

< Z ± ± ÿ • E = y] i " F Ä d_{iB} " d_{i0} 1 d_i ± ±] i 3

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Bo Ç v 0Y B W Ö . A L • ä
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 < Z " $\theta_{i0}^{3/4} g f E \epsilon k > y \ddot{i} 504$ % & $s_{iB} ! o$) " Ä

$s_{iB} = x_{i0} + a_{i0}^{-B} a_{i0}^{-C} - \theta_{i0}^{3/4} o$ % o
 Ä] 0Y B W Ö . L • + ± ‡ Ô c F ü

$x_{i0}^M = a_{i0}^{-B} a_{i0}^{-C} + \theta_{i0}^{3/4} o - k_{iB} s_{iB}$ % ! o
 < Z " $k_{iB} > ! % g^3 E - z \& ; ‡ Ô c F ü l o) D \ddot{8} Z$
 BB + ± M ! • 6 Ö í S ' ± ± : o @ ð Ä D \ddot{8} " 3 $x_{i0}^M E \delta -$
 Kc { E \$ " • " Ä \$ " ; + ± ‡ Ô c F ü ÷ £ Ü

3 g ä
 $\tau_{i0}^{3M} + x_{i0}^{3M} = x_{i0}^M x_{i0}^{3M} % o = x_{i0}^M % o$
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$s_{i0} = x_{i0} - x_{i0}^{3M}$ % o 0 o
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 $s_{i0} = a_i x_{i0} + x_i + d_{i0} - x_{i0}^{3M}$ % o o
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‡ Ô c F ü ä
 $x_i^M = - a_i x_{i0} - a_{i0}^{3M} + x_{i0}^{3M} - k_{iB} s_{i0}$ % o x o
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 $\tau_{i0}^{3M} + x_{i0}^{3M} = x_{i0}^M x_{i0}^{3M} % o = x_{i0}^M % o$
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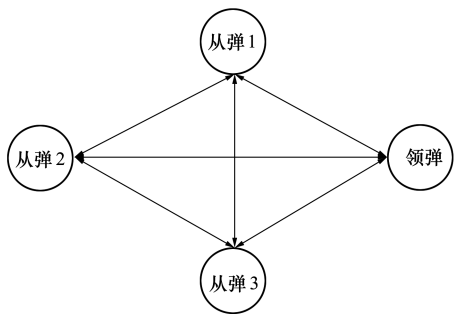
$u_i = b_i^{-B} a_{i0} x_{i0} - a_{i0} x_i - a_{i0}^{3M} -$
 $\alpha_{iB} k_{iB} - k_{i0} | s_i | \lambda_i k_{i0} % o o$ % o o
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 c) ; Ô c - € C 0 Ä " ± ± 6 u T " t @ ë Wf e M ³
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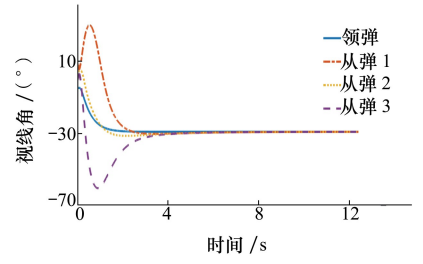
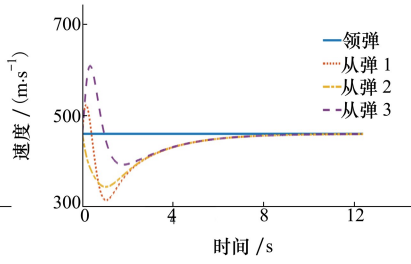
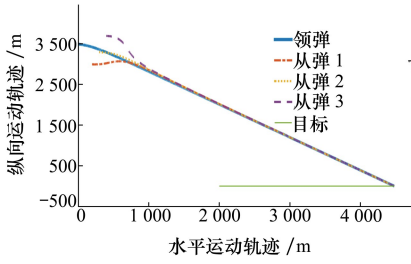


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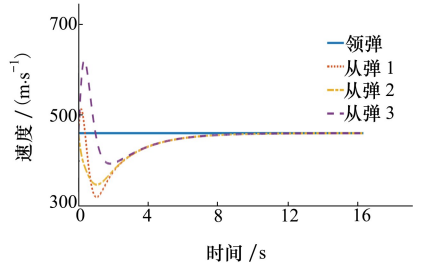
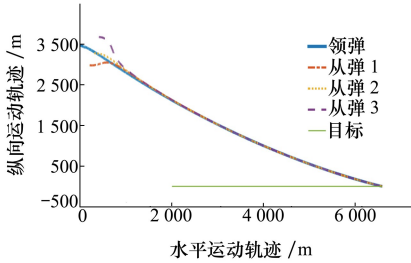
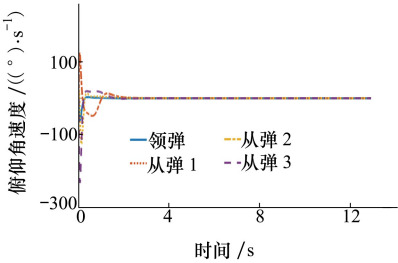
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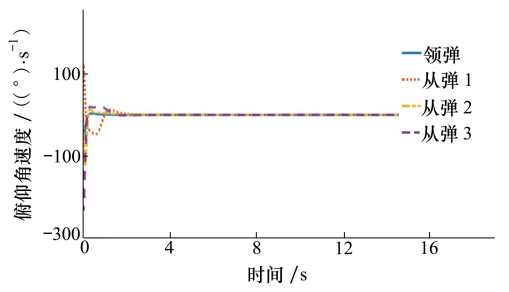
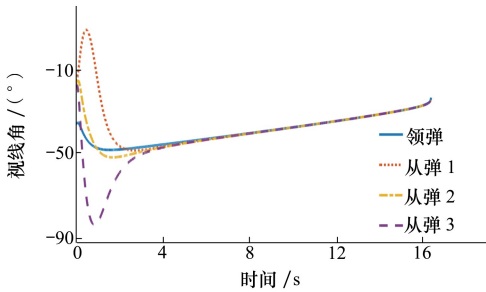
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 1, 4±DýÖD•E& 1 eû f |ELÓ 3i 1 eû f |>ó3i>y 3i

ææ+ x=•g U, 4 ‡ - ELDýÖ±±è • 8 " Wf æM³f | æè f | 1, 4±DýÖD•E&" û + Z ,8 ' U | 9 Ô c 0f* ±±%*U 8 " Wf eû f | ±DýÖ D•E&E#=# 9 æM³f | DýÖD•E&B, » - 7! " - 3ö È (Ý³ æM³f | 1 eû f | | 9 W±, ±±"DýÖD•E& 3i D° #p" W#K!D°- "A c ^ ELÓD° "æ 6 D°ª ±± / Ç T % + " =•g æM³f | 1 eû f | ±±ELÓ C

3i "û + Z ,8 ' eû f | ±±ELÓE=# c ^] æM³f | ±±ELÓ % + =•g æM³f | 1 eû f | ±±ó3i>y C 3i "û + Z ,8 ' æM³f | 1 eû f | F*c ^] ,%Á±±ó3i>y L H i "c ^ Dø8 D° #p"& CF ÿ • æ 6 D°g±±Qÿ T % + @•g æM³f | 1 eû f | ±± >yELÓ 3i %, 4DýÖè • 0±±, ,L + " + 7 ßß.m.g %



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ææ+ =•g U, 4 ‡ Í ELDýÖ±±è • 8 " Wf æM³f | æè f | 1, 4±DýÖD•E&" û + Z ,8 ' eû f | 9 d È (Ý³ C K¹æM³f | &, 4±± | 9 W"DýÖD•E&D° #p" / Ç T D°ª % + ß =•g æM³f | 1 eû f | ±±ó3i>y C 3i "û + Z ,8 ' "

U & Í ELDýÖ, 4 W# "æM³f | 1 eû f | F*6* U (Z, 4 z c ^] ,%Á±±ó3i>y L H i "c ^ Dø8 D° #p"& CF ÿ • æ 6 D°g±±Qÿ T % EÐ& 0.ú è • 8 W, 4±±, ,L4 É ,8 ' "@±±æ 6 h (>y3ÓE±±G Wf | 9 c) Ô

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Äç î ÷Lk" Äç¶¶H î ÷Lk žk

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Ü çY-9PYä • •ù wL] ü wçwæu qwç ü•ç èUæž qç&] Uè) w èwæu qwæd wLk w ÷d ç qLæwLèk üžk
 vLèw Uèù) =wèüw) ü•q dLæi üžv Uk•çw] ÷d ç qLæwLèk üž vLèw&U) •ž çwkdwv kü=Uèù
 Uè) üžv = qçqç) Žè=Ÿ wL] Uè] Uæi] •) •! çwkdwv kü=Uèù Uè) üžv = wL=d > &f ü] &ç=çk
 wL èwæu qwçwLk wç Uæi] vèž] •) ÷d wL) fžL è ù @Uæž •! wL èwæu qwç •ž çwæd qLè Ž d wŸ
 üLŸçk kLè 4wè) vLw •& wü ç =) ü •q) w wŸ Uw Uè) ü] q ž Uw wL üçž ç è) =wèüèù Ž>U) •ž
 wL wŸ Uw) üUè Uè) !Uwèž èkUè Uè) fžL è ù üèLü ÷=çk üžv] wL) wL çH Uk•çw] •! U ç = kèk
 è+ d èž" &U) •ž) =wèüw) ü•q dLæi U çK • ç] •) " wL ü•q dLæi üžv wLwvf •!] ü wçwæu
 ü qwç =) çž) Uè) kèi •üw q) è w •) ç Uæž •ž çwæd qLè " dèd Uè vLè] ç) w wL ü]] Uè) •!
 wL ü •üŸ Uè) vLwüwç Uè] &U) •ž ' è] Uæi ç Uæž Žè=Uf" w üžv wL !• ç wL wŸ üLŸçk
 kLè 4wè) vLw •& wü ç Uè) wL) fžL è ù üèLü ÷=çk üžv] wL) Uè U•qw Ž d ç ü Uæž ç üw
)] •ž vLw wL !! üwè è •! wL) =wèüw) ü•q dLæi üžv Uk•çw] Ž

Bæ s-çã ç qLæwLèk üž vLèw+çwkdwv kü=Uèù Uè) üžv + 4wè) vLw •& wü ç fžL è ù üèLü ÷=çk
 èk üžv + =wèüw) ü•q dLæi üžv Uk•çw] +ü•q dLæi üžv wLwvf