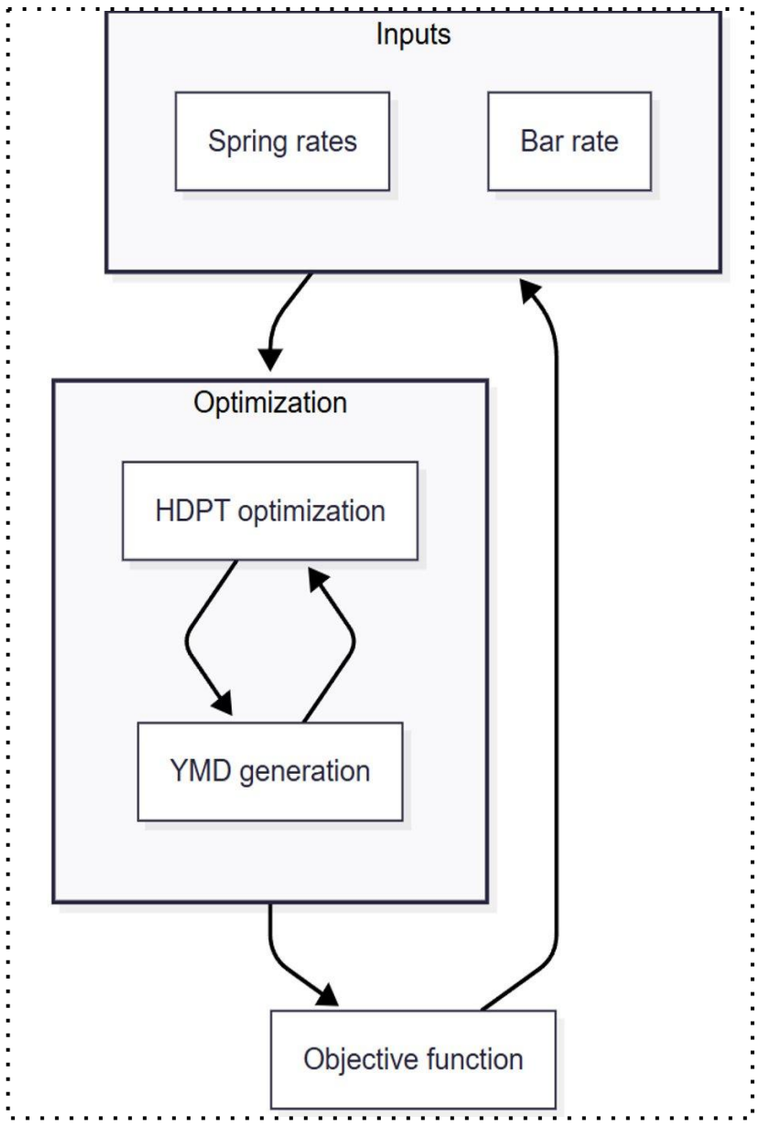
LHRE

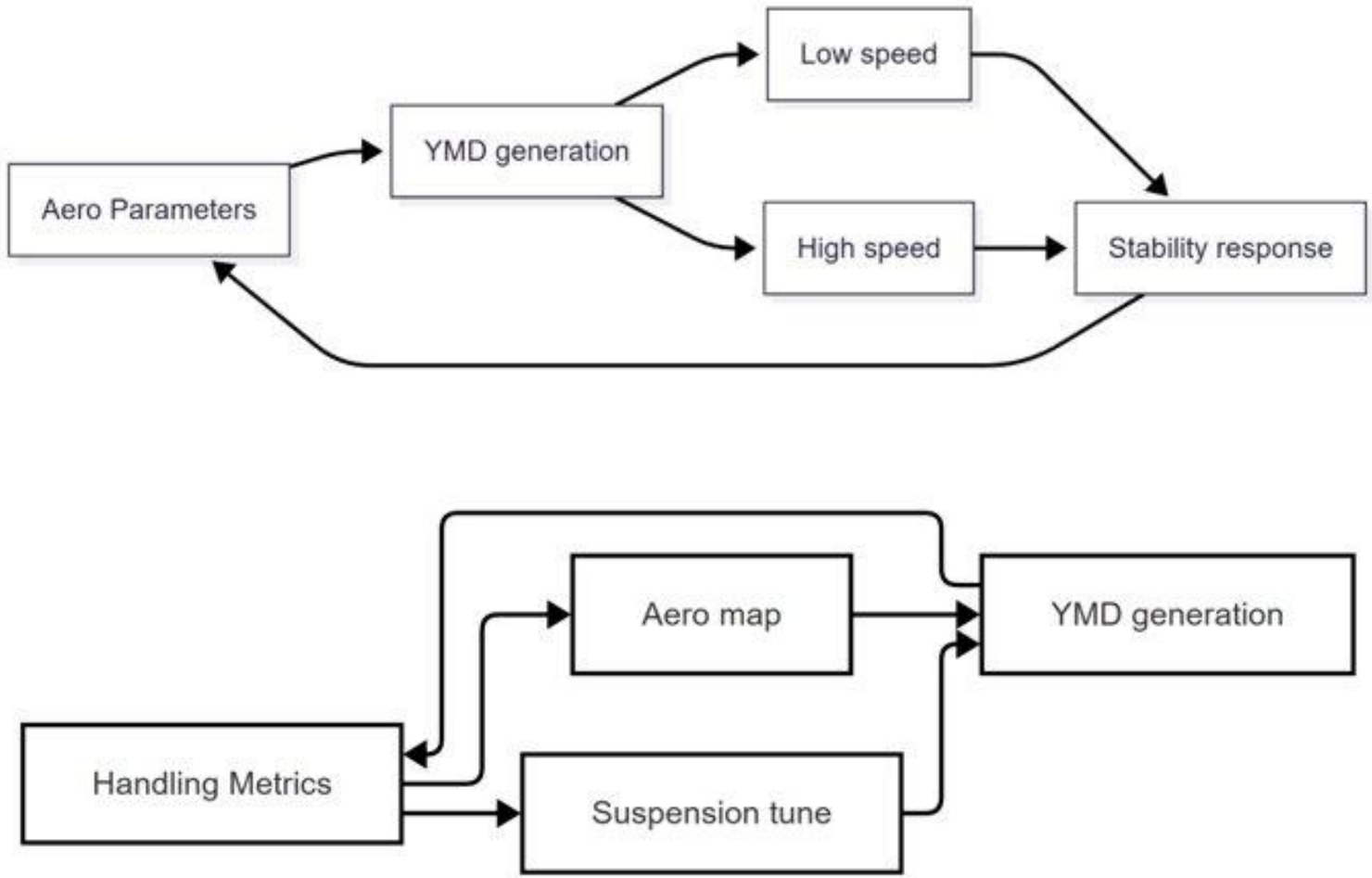
Design Workflows and Studies

System: Vehicle Modeling (VMOD)

Handling and Integration Workflows

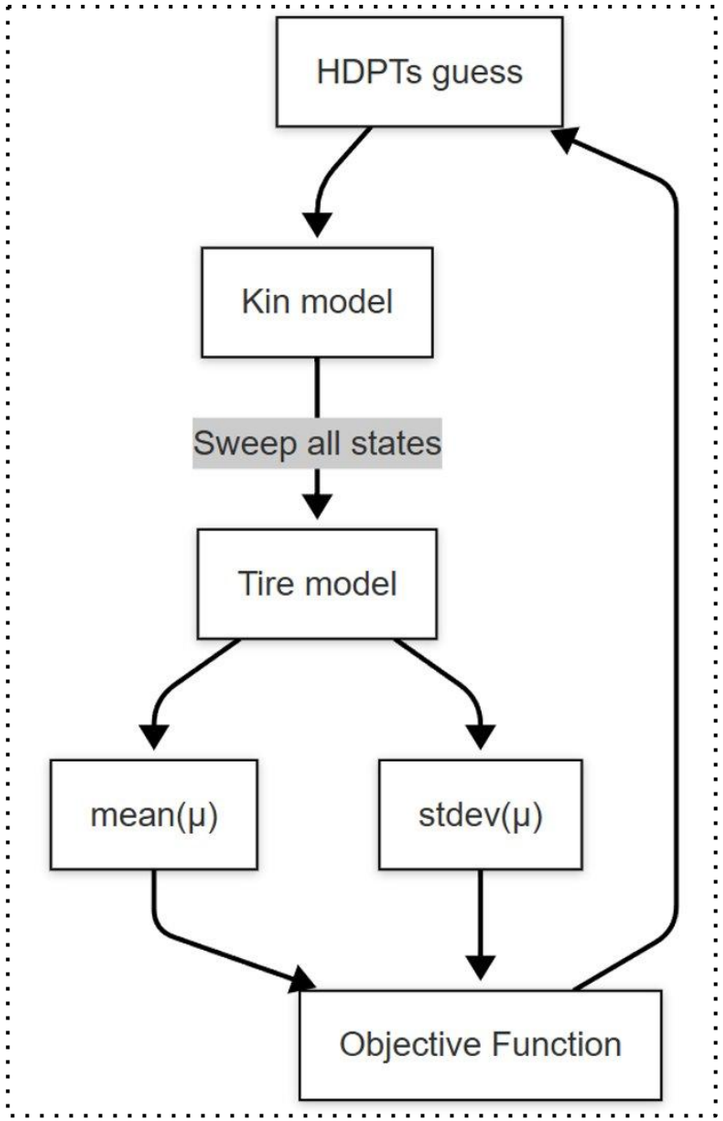


Maintaining Balance

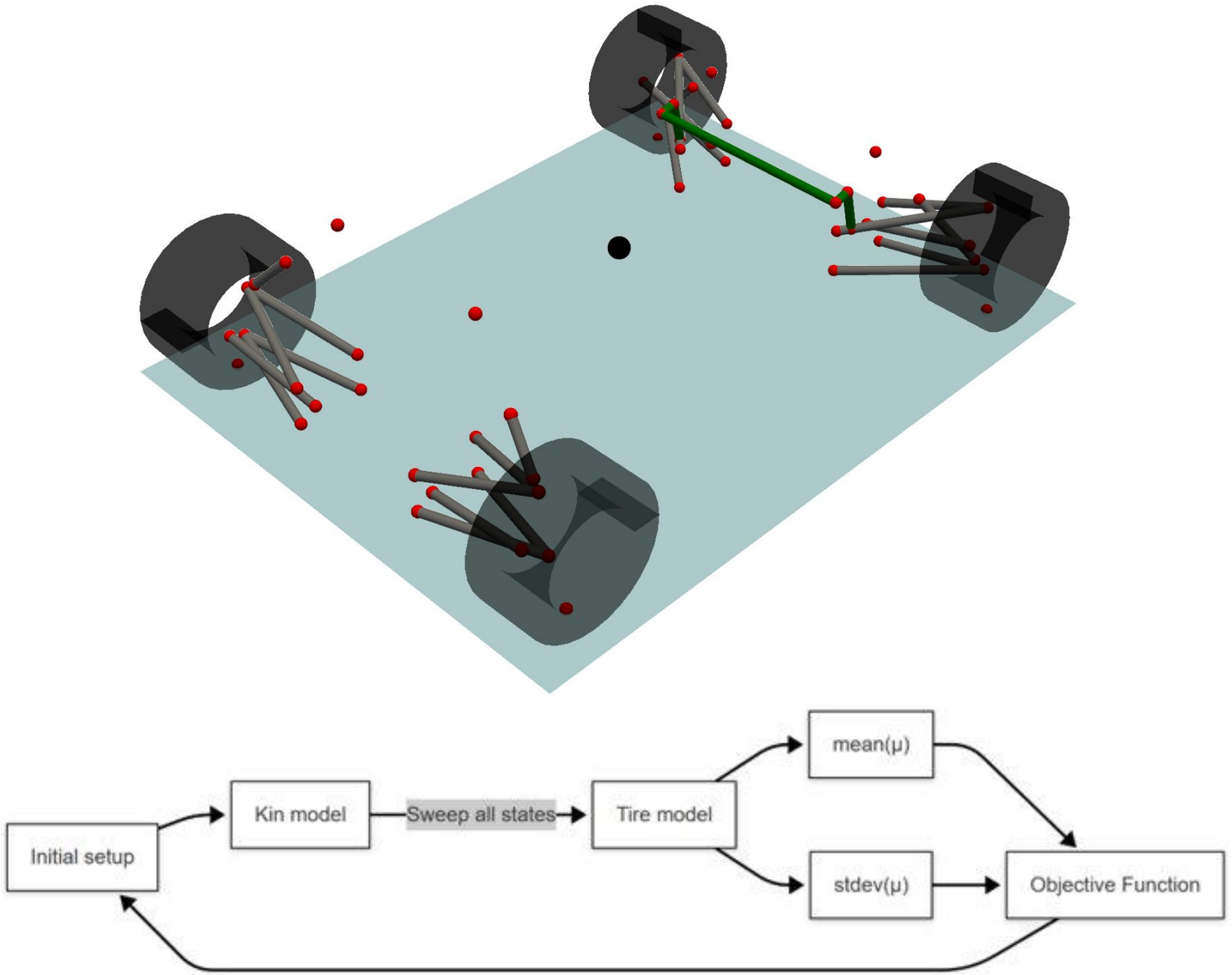


Aero Integration

Performance Workflows



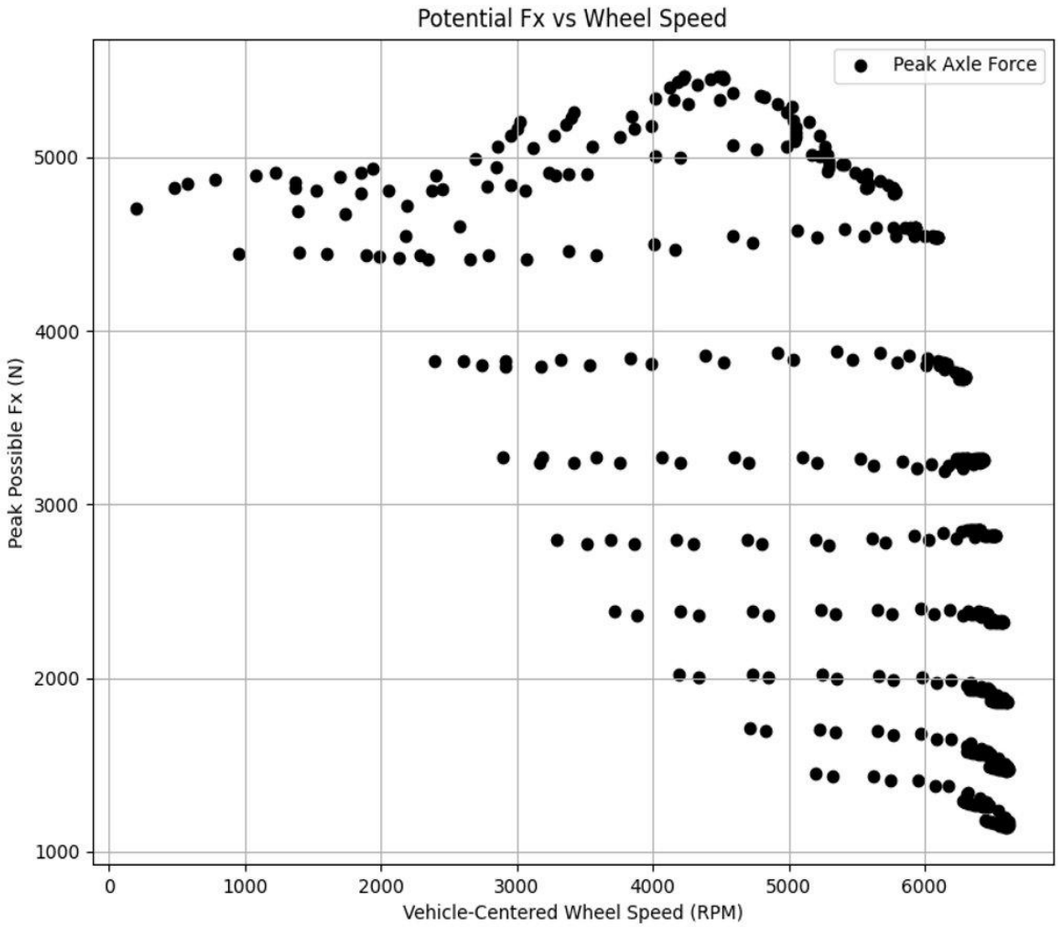
Maximizing Grip



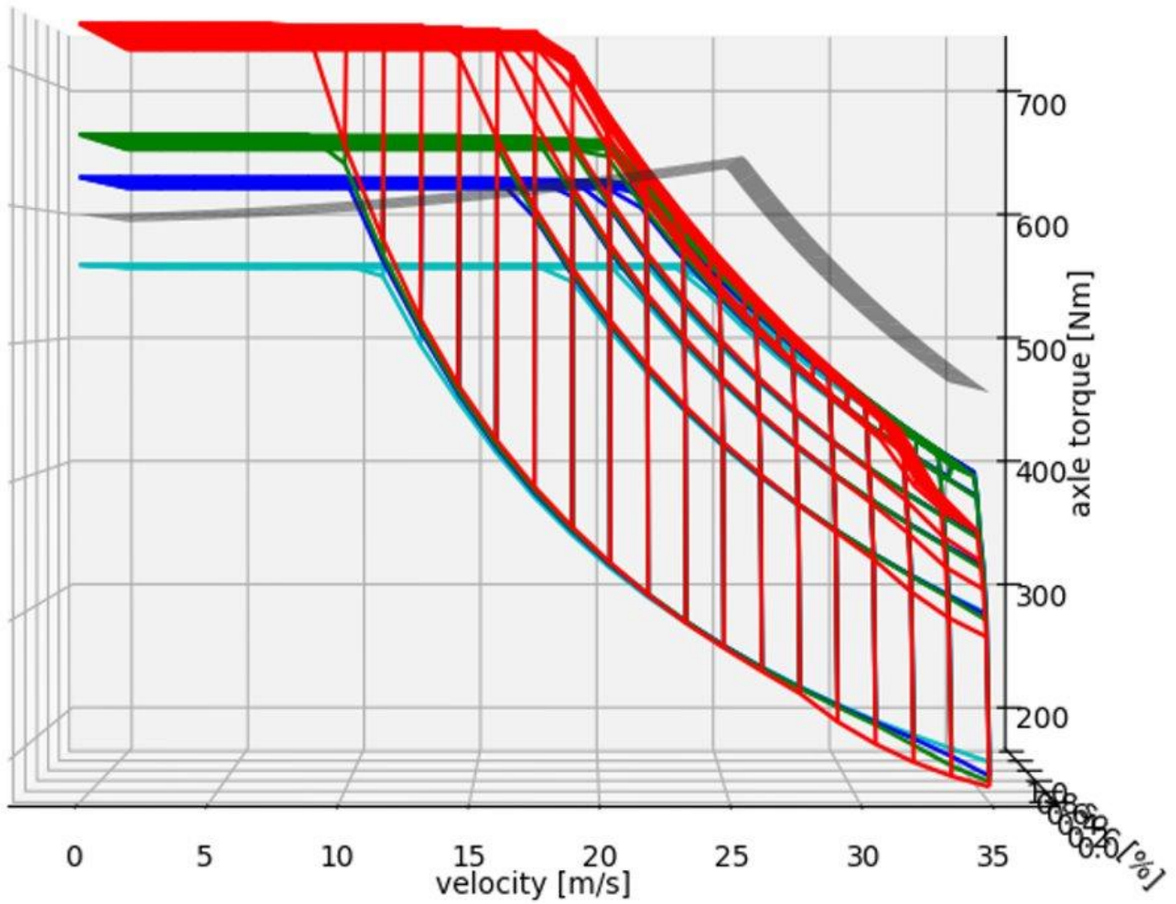
Kinematic Parameter Optimization

Design Studies

Grounding Drivetrain in Tires

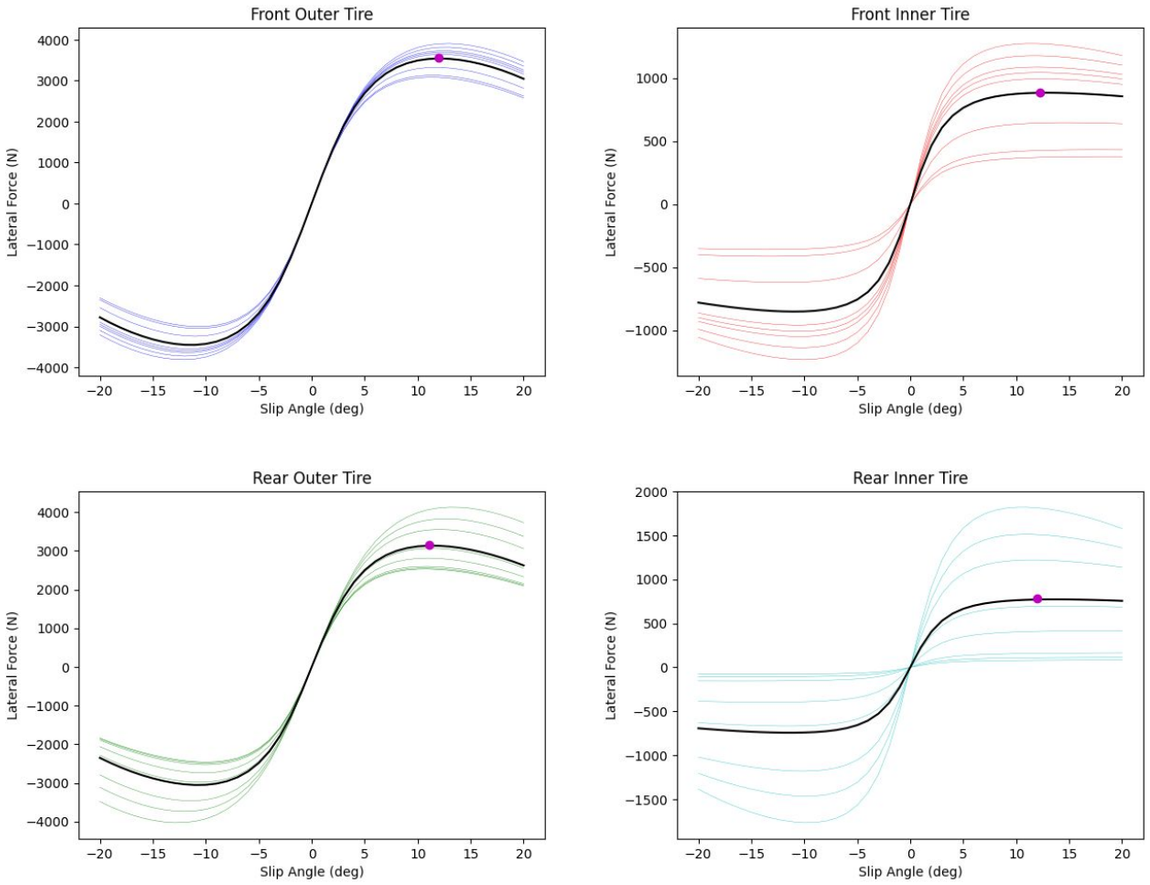


Tire Limit

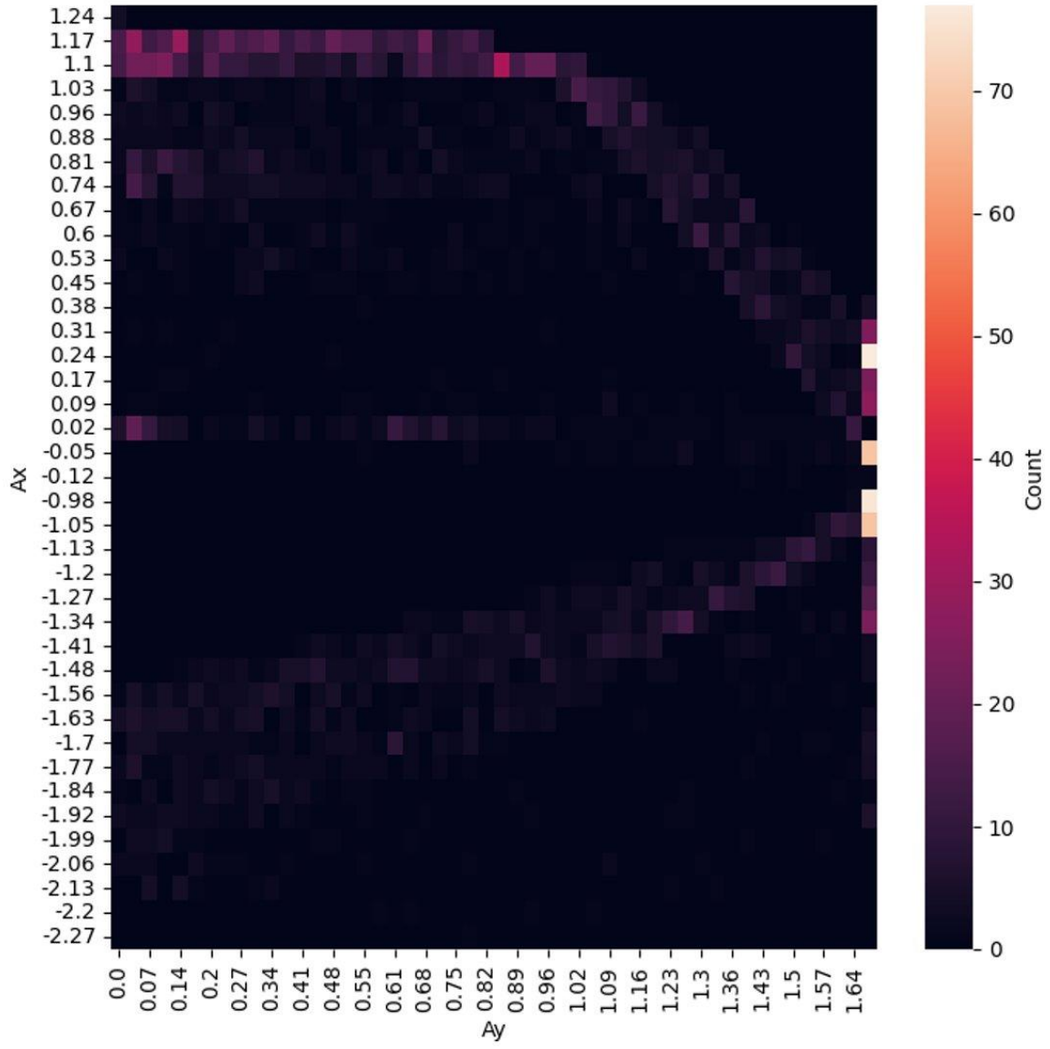


Tire Limit Against DT Configs

State Frequency Per Track

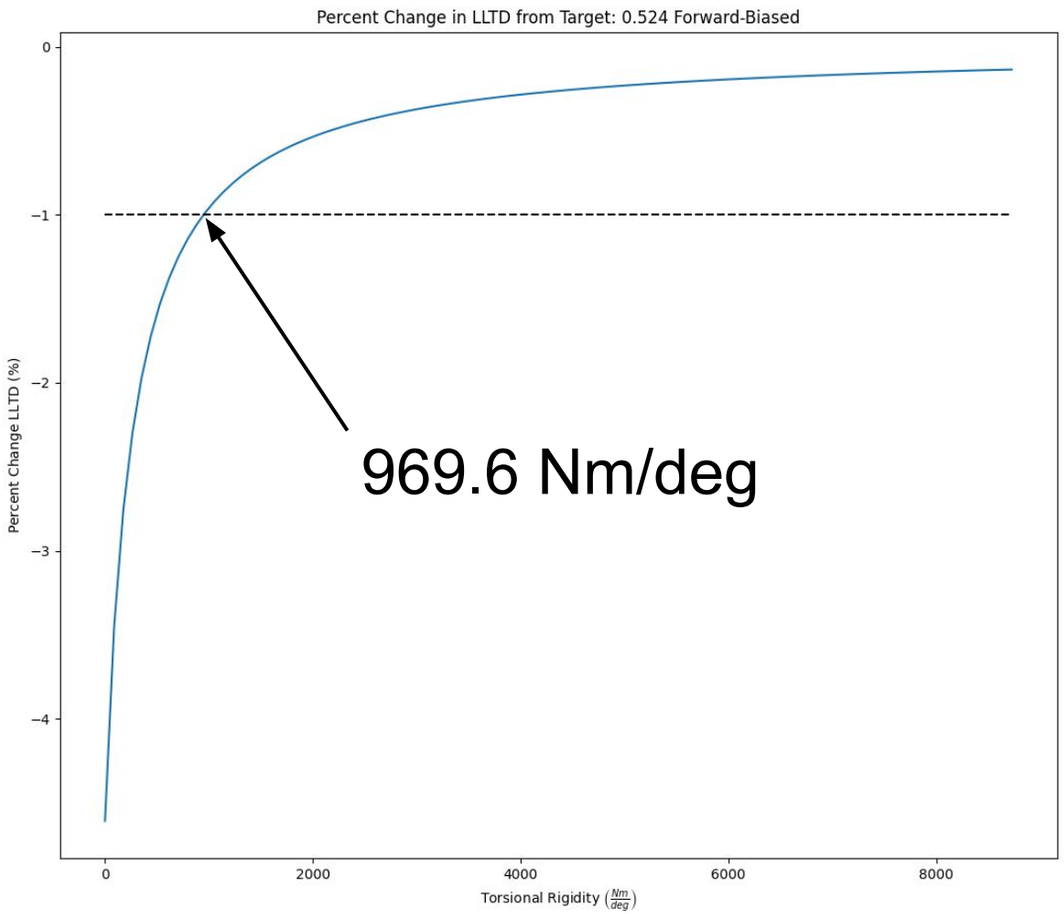


Ackermann from State Frequency

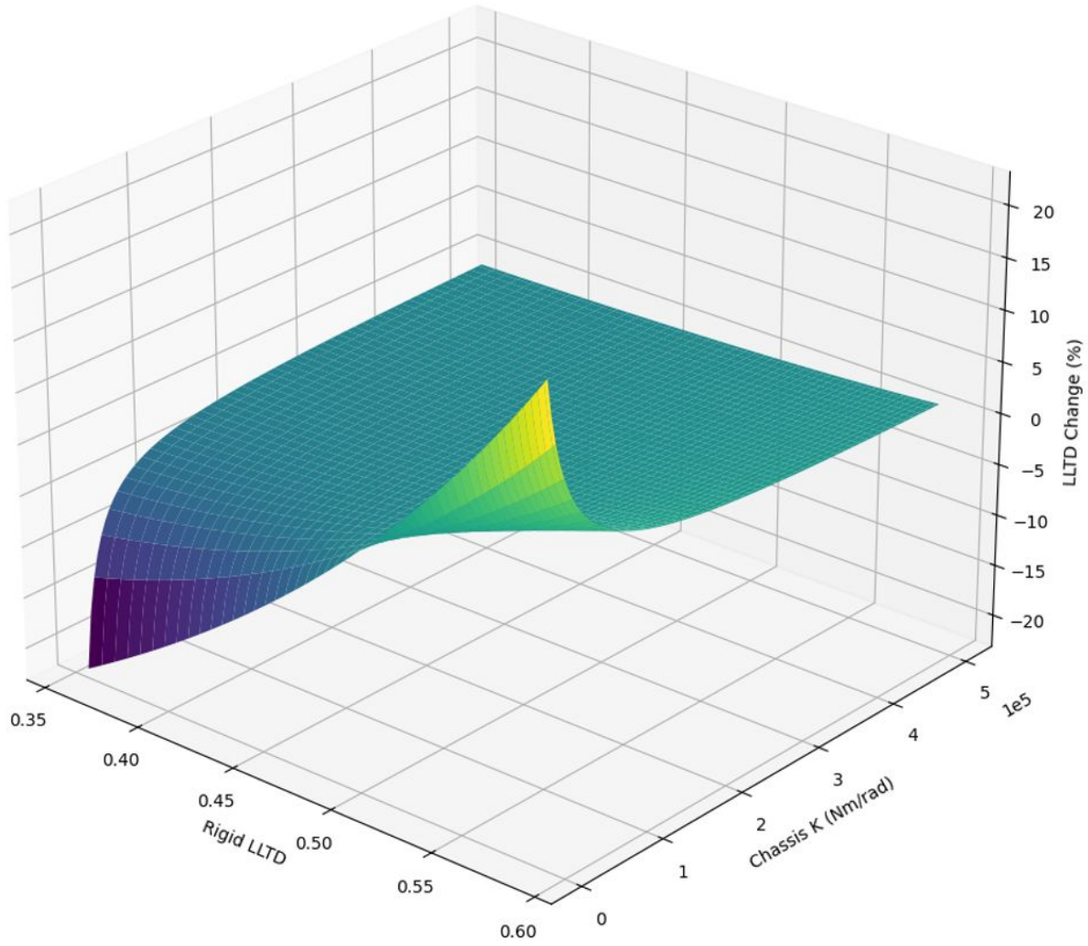


Flattened GGV Trace

Torsional Rigidity (TR) Influence on LLTD Control



TR at Max 1% LLTD Change



Percent LLTD Change from Target

Quasi-Steady-State Report

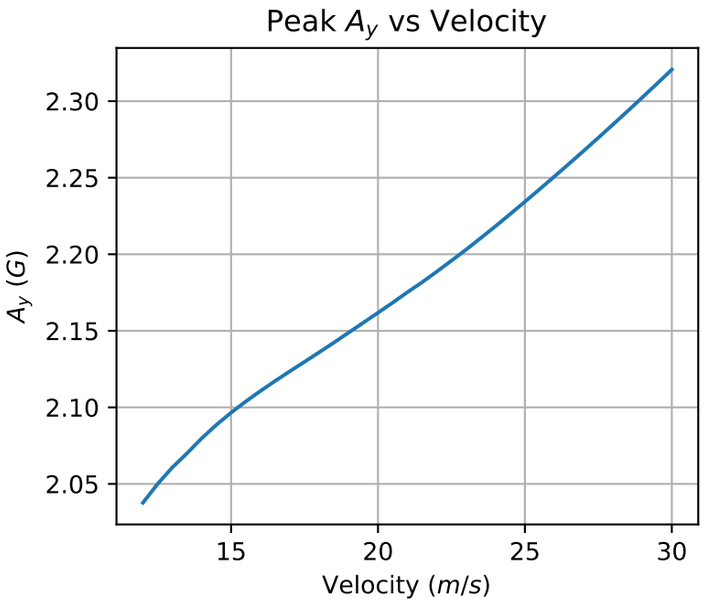
Simulation Author: Robert Horvath

Generated By: Robert (roberthorvath5@gmail.com)

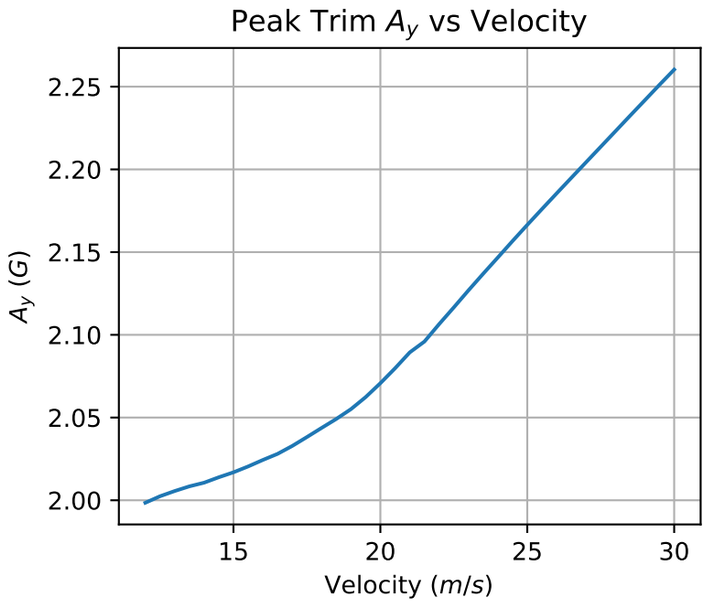
Date: 2025-06-19, 06:36 AM PDT

Note 1: The variable δ always refers to the average heading angle of the front tires

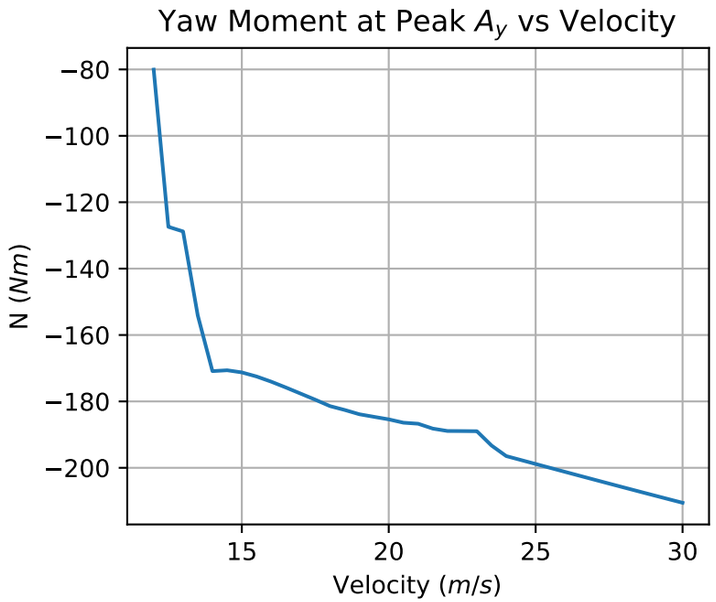
Acceleration vs Velocity



	$\frac{dA_y}{dV}$ $\left(\frac{G}{m/s}\right)$
at Min Velocity	0.026
at Avg Velocity	0.013
at Max Velocity	0.018

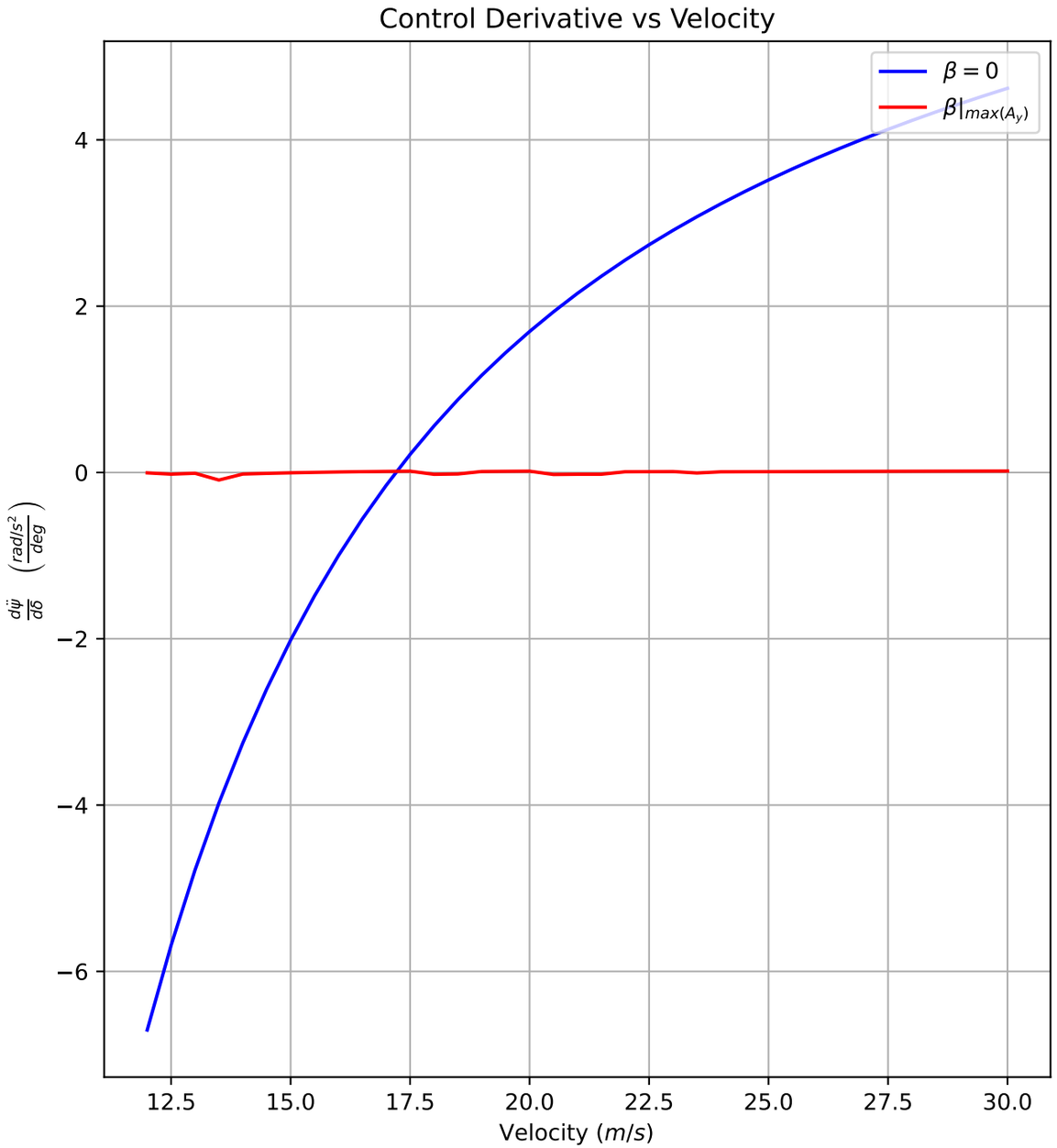


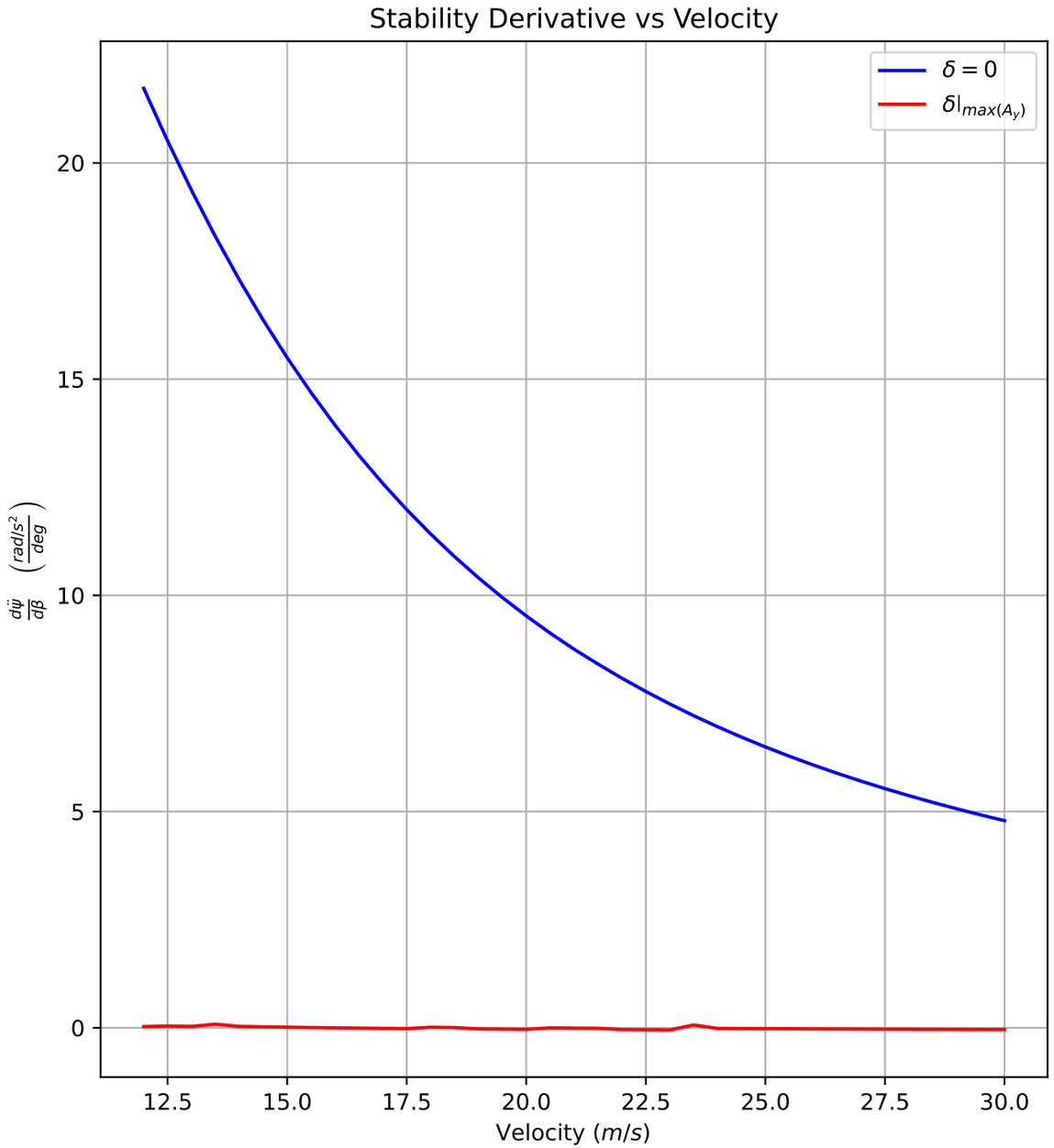
	$\frac{dA_y}{dV}$ $\left(\frac{G}{m/s}\right)$
at Min Velocity	0.009
at Avg Velocity	0.015
at Max Velocity	0.018



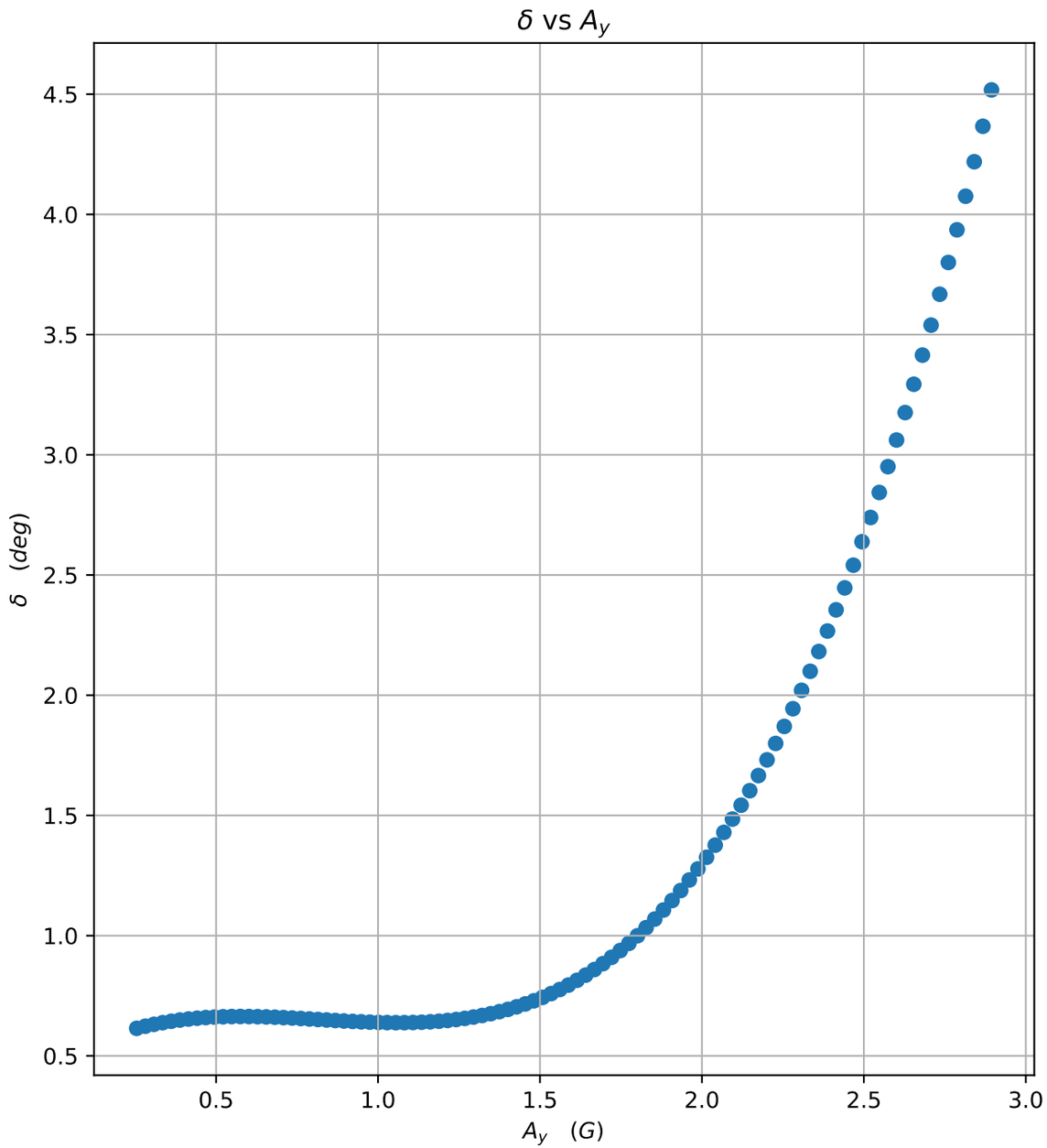
	$\frac{dN}{dV}$ $\left(\frac{Nm}{m/s}\right)$
at Min Velocity	-21.026
at Avg Velocity	-0.179
at Max Velocity	-0.233

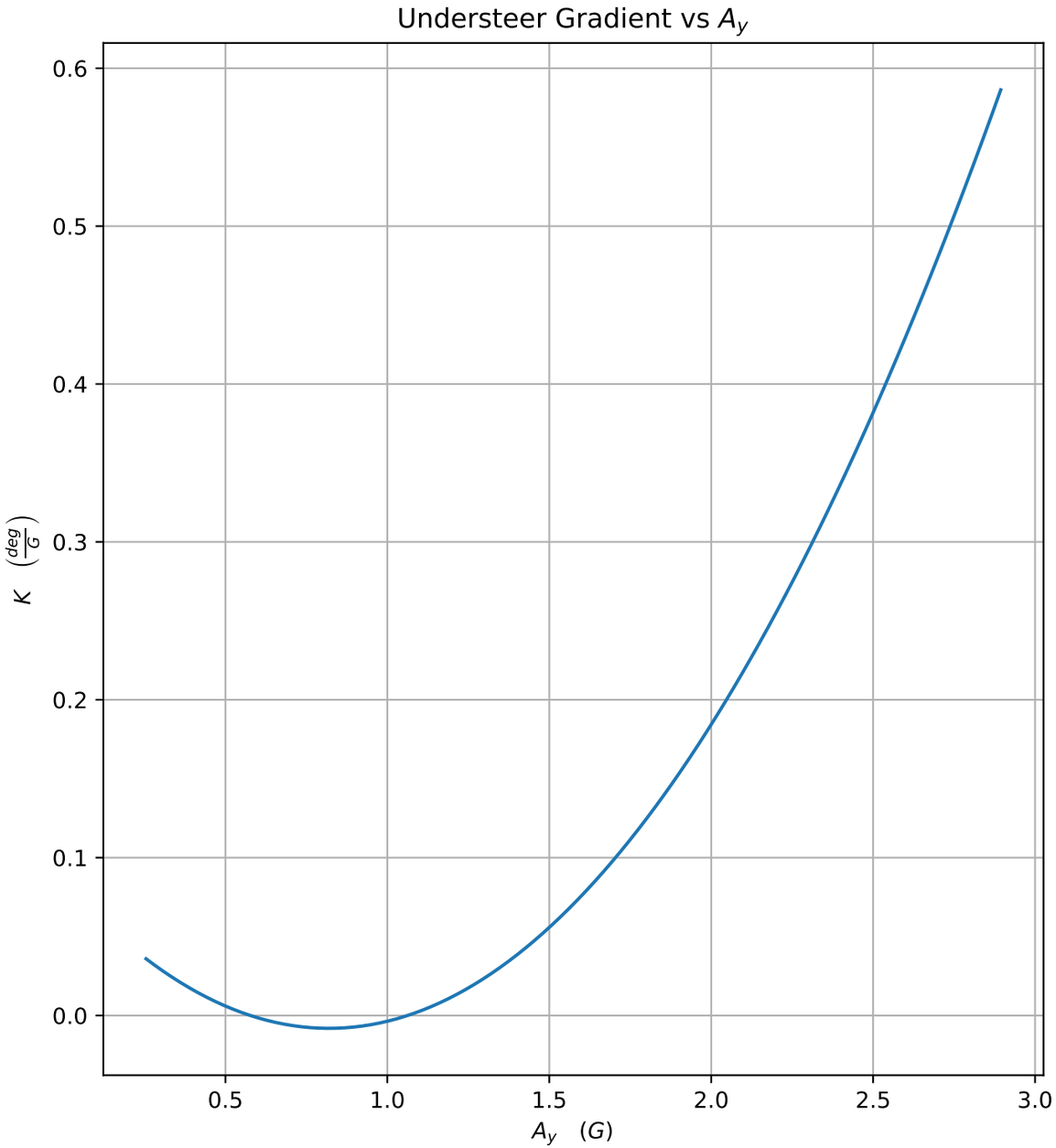
Control, Stability, and Handling



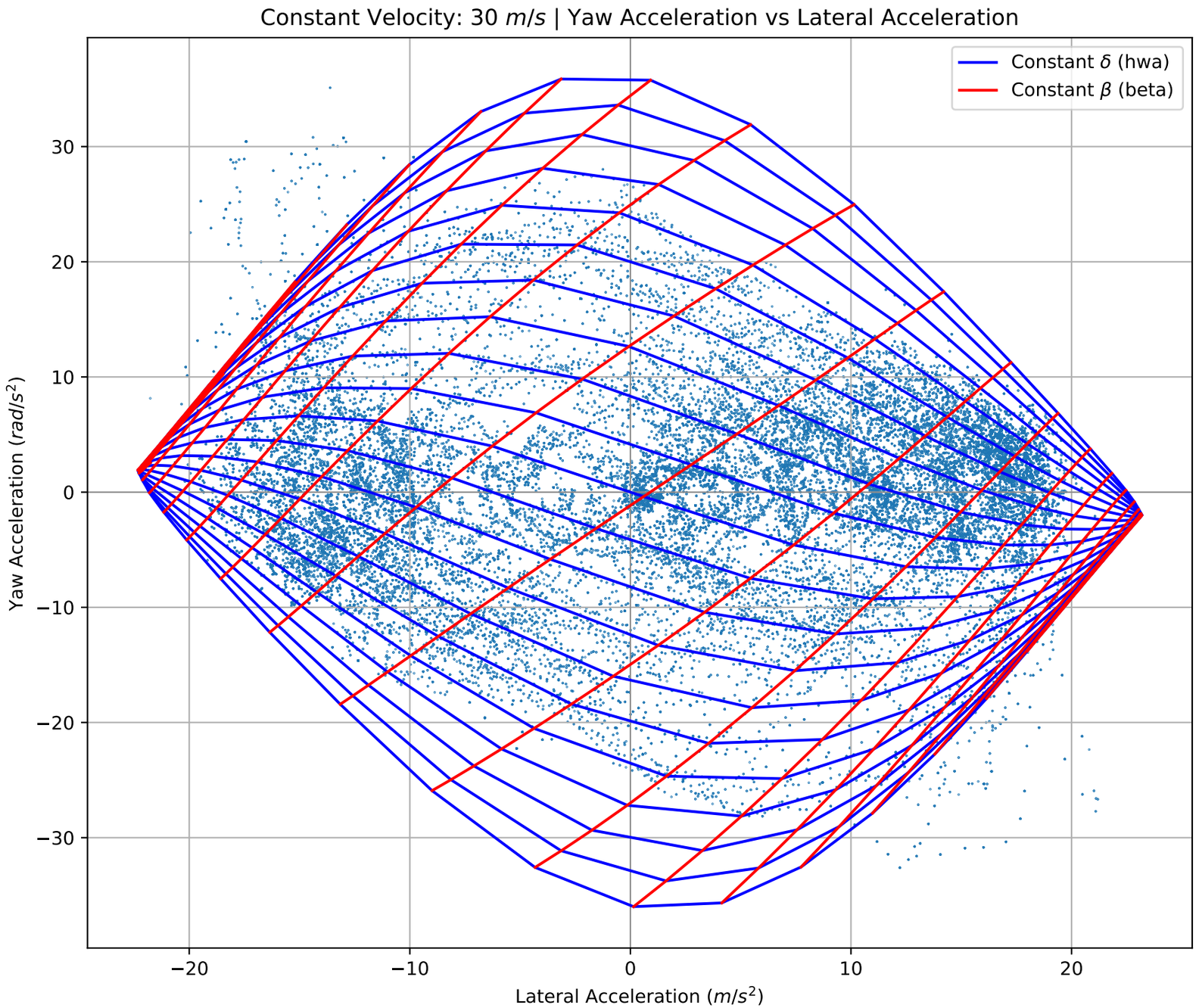


...continued


δ vs A_y
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
δ (deg)
0.5
1.0
1.5
2.0
2.5
3.0
A_y (G)

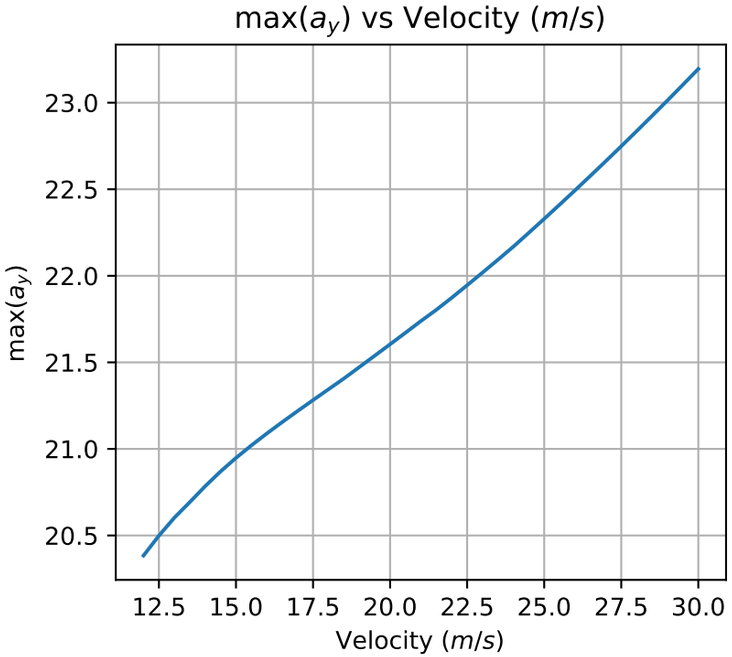

Understeer Gradient vs A_y
0.6
0.5
0.4
0.3
0.2
0.1
0.0
K $\left(\frac{deg}{G}\right)$
0.5
1.0
1.5
2.0
2.5
3.0
A_y (G)

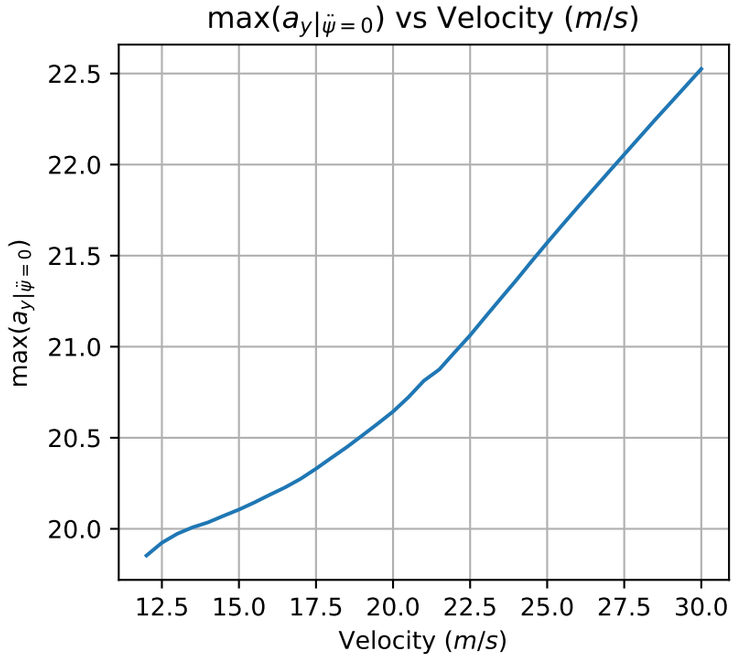
Correlation Dataset

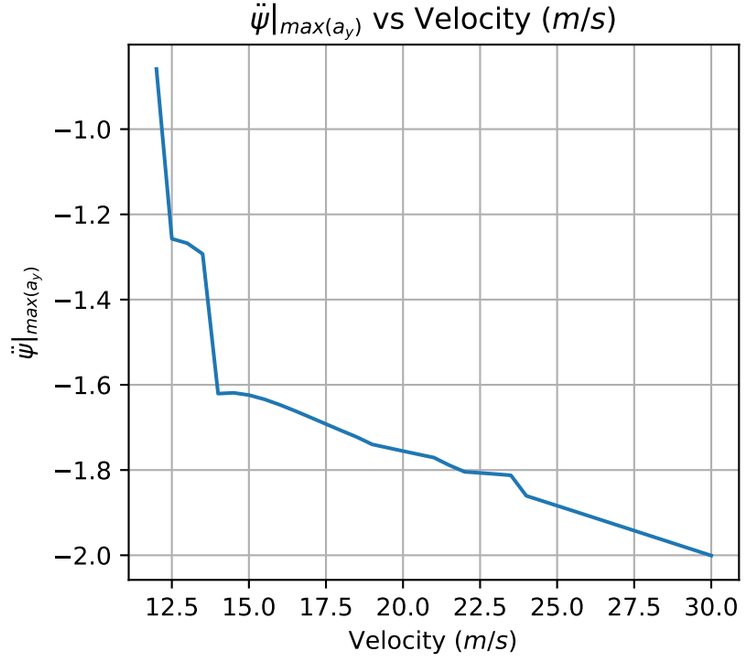


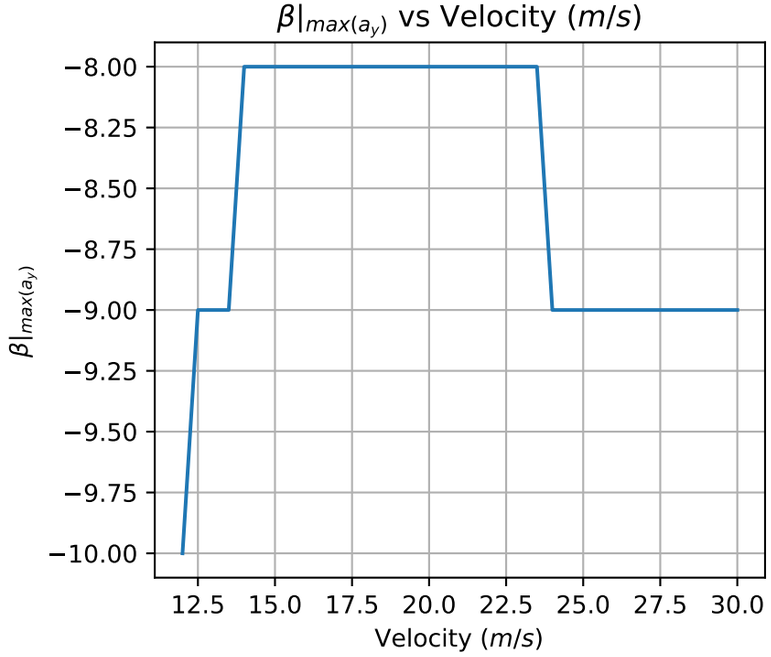
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-22.335	23.195
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.822	22.525
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.891	-2.001
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.989	35.867
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.145	-3.140
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.029	0.005
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.142	0.060
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.620
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.790

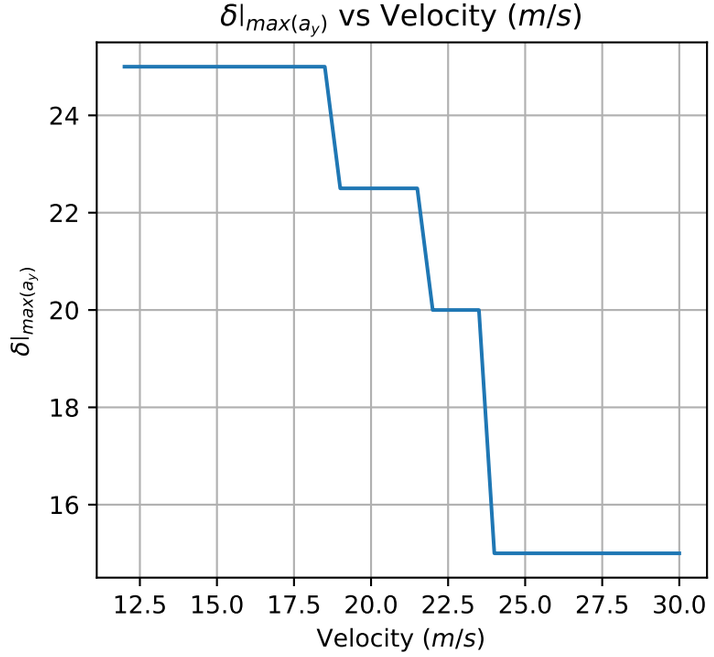
Appendix

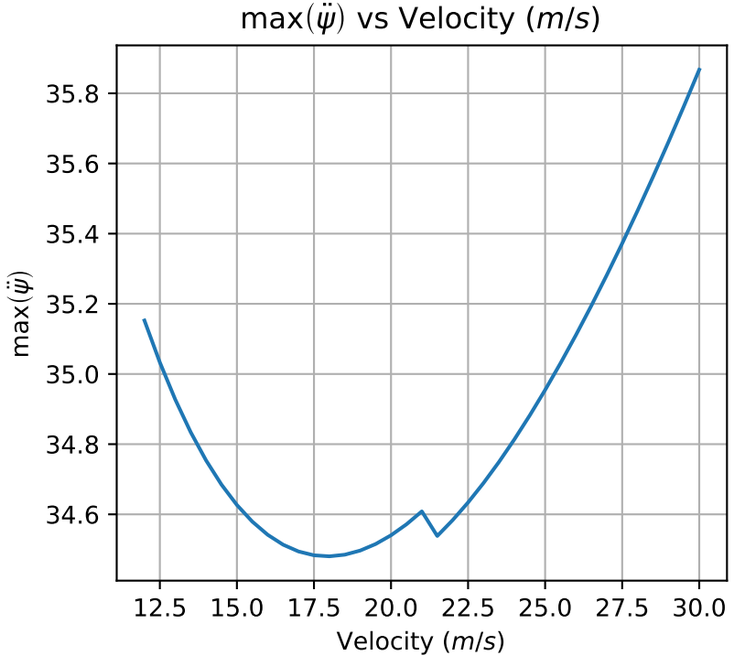

max(a_y) vs Velocity (m/s)
max(a_y)
Velocity (m/s)

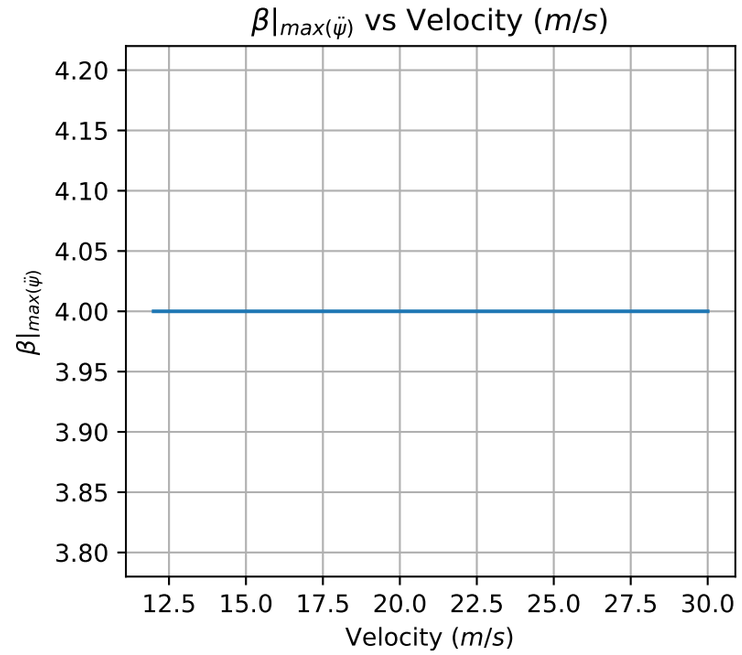

max($a_{y|\ddot{\psi}=0}$) vs Velocity (m/s)
max($a_{y|\ddot{\psi}=0}$)
Velocity (m/s)

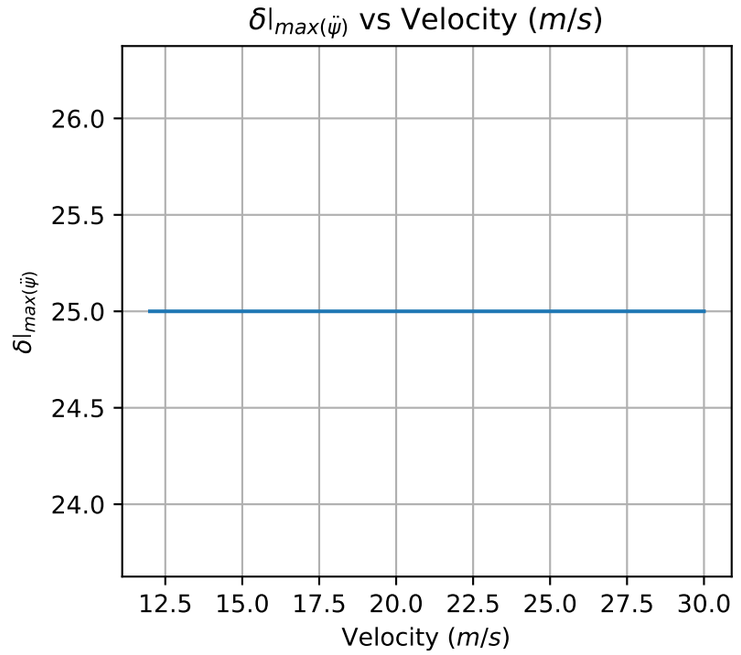

$\ddot{\psi}|_{max(a_y)}$ vs Velocity (m/s)
$\ddot{\psi}|_{max(a_y)}$
Velocity (m/s)

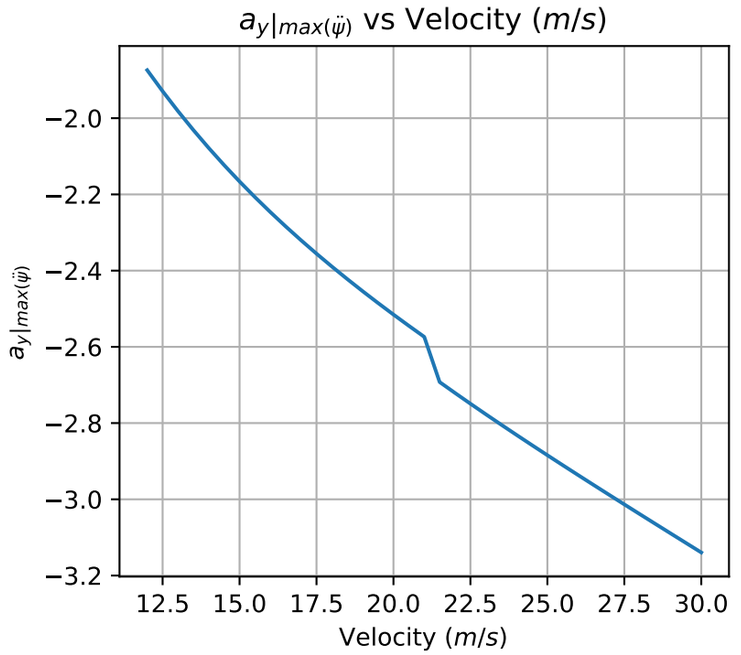

$\beta|_{max(a_y)}$ vs Velocity (m/s)
$\beta|_{max(a_y)}$
Velocity (m/s)

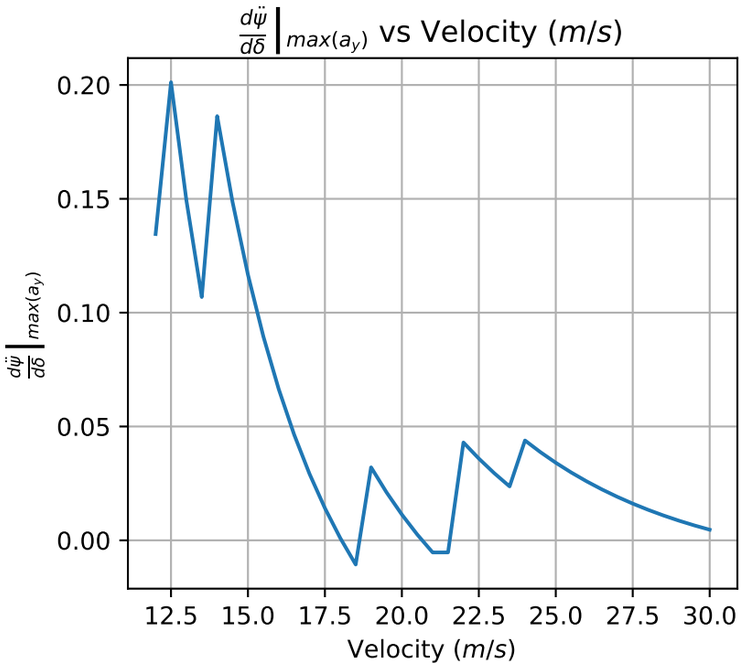

$\delta|_{max(a_y)}$ vs Velocity (m/s)
$\delta|_{max(a_y)}$
Velocity (m/s)

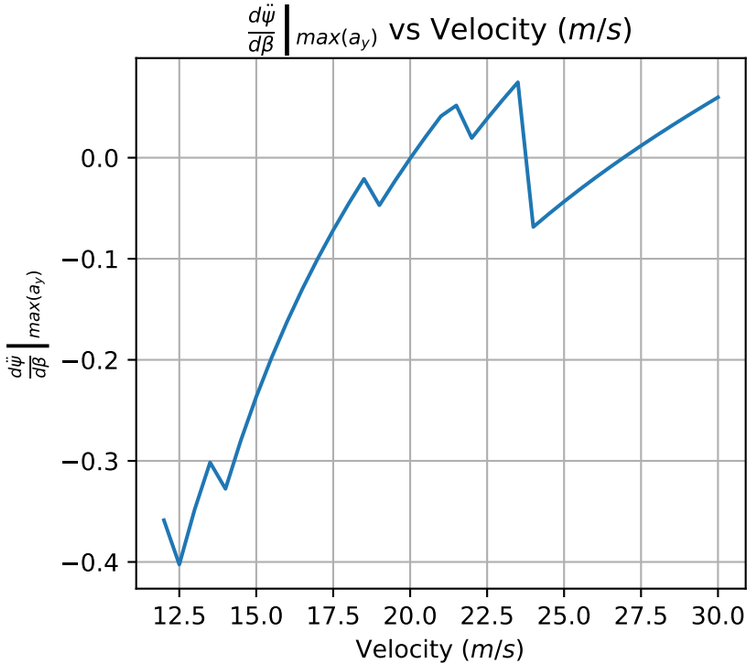

max($\ddot{\psi}$) vs Velocity (m/s)
max($\ddot{\psi}$)
Velocity (m/s)

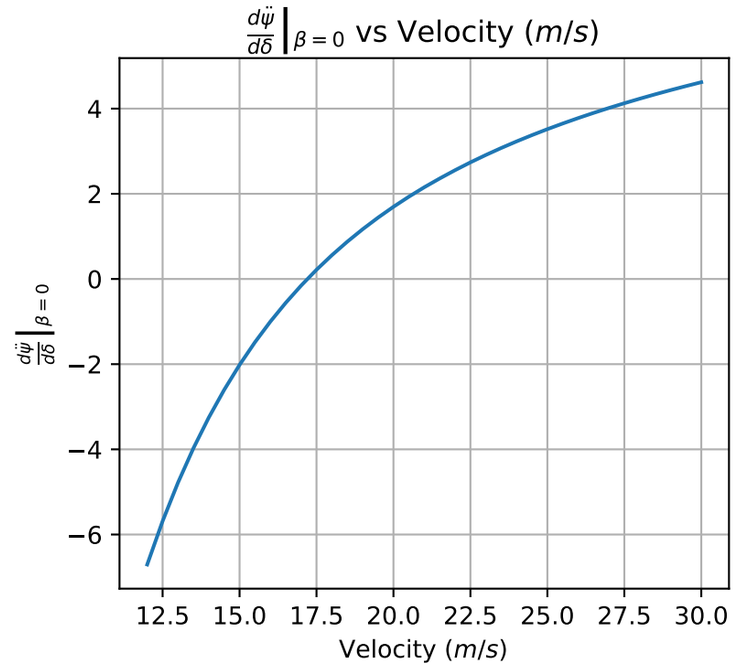

$\beta|_{max(\ddot{\psi})}$ vs Velocity (m/s)
$\beta|_{max(\ddot{\psi})}$
4.20
4.15
4.10
4.05
4.00
3.95
3.90
3.85
3.80
12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Velocity (m/s)

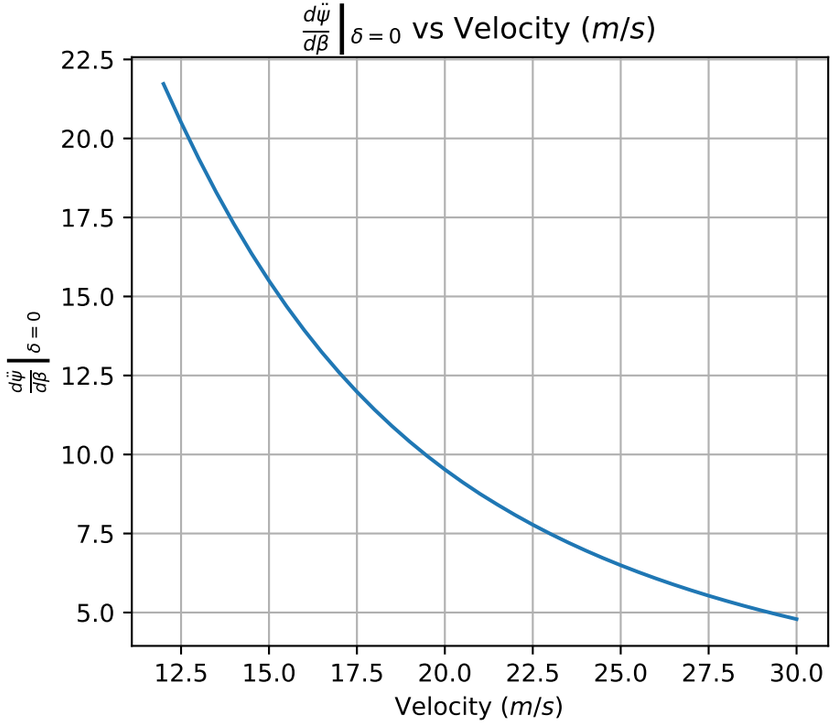

$\delta|_{max(\ddot{\psi})}$ vs Velocity (m/s)
$\delta|_{max(\ddot{\psi})}$
26.0
25.5
25.0
24.5
24.0
12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Velocity (m/s)

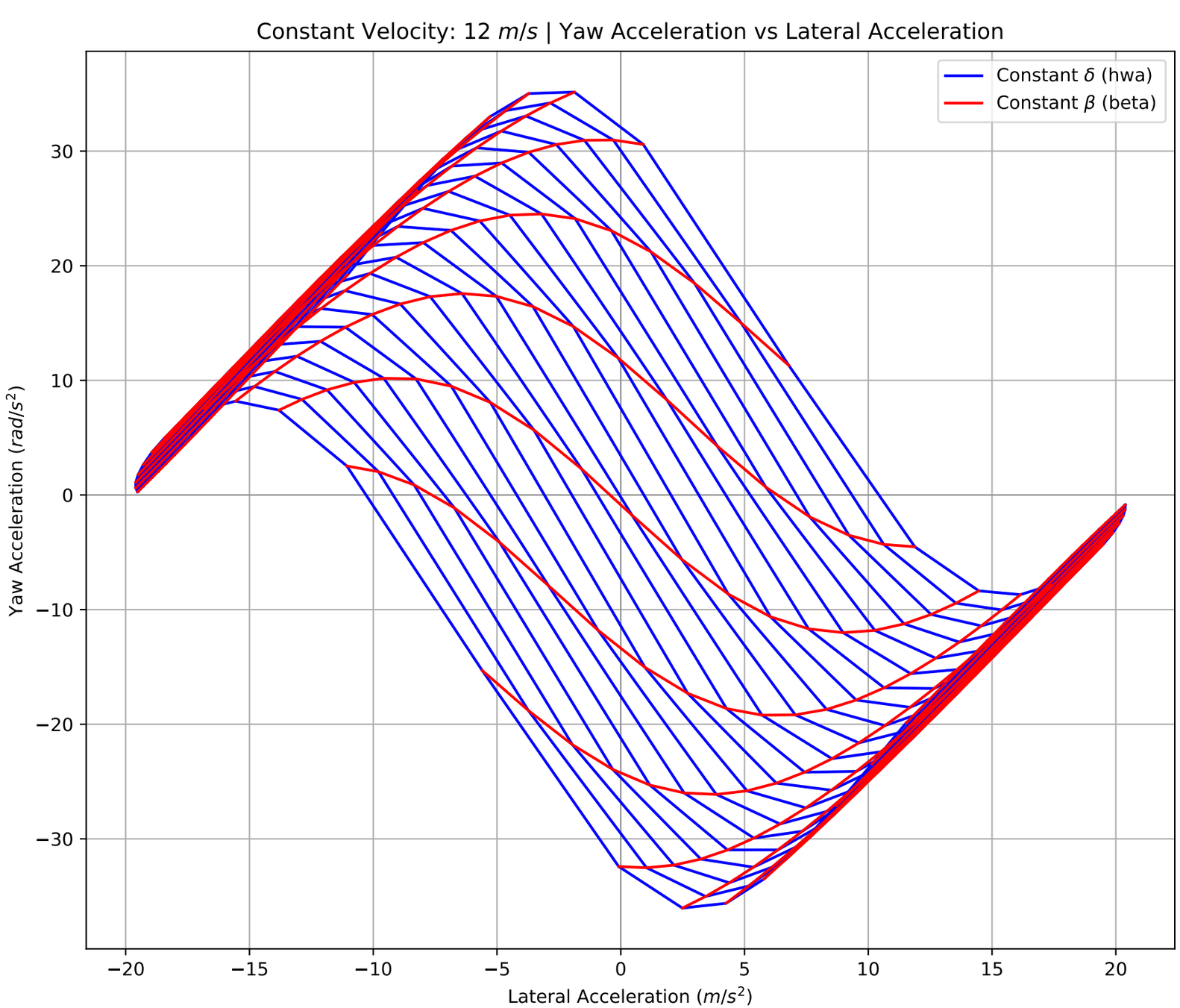

$a_y|_{max(\ddot{\psi})}$ vs Velocity (m/s)
$a_y|_{max(\ddot{\psi})}$
−2.0
−2.2
−2.4
−2.6
−2.8
−3.0
−3.2
12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Velocity (m/s)


$\frac{d\ddot{\psi}}{d\delta}\Big|_{max(a_y)}$ vs Velocity (m/s)
$\frac{d\ddot{\psi}}{d\delta}\Big|_{max(a_y)}$
0.20
0.15
0.10
0.05
0.00
12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Velocity (m/s)

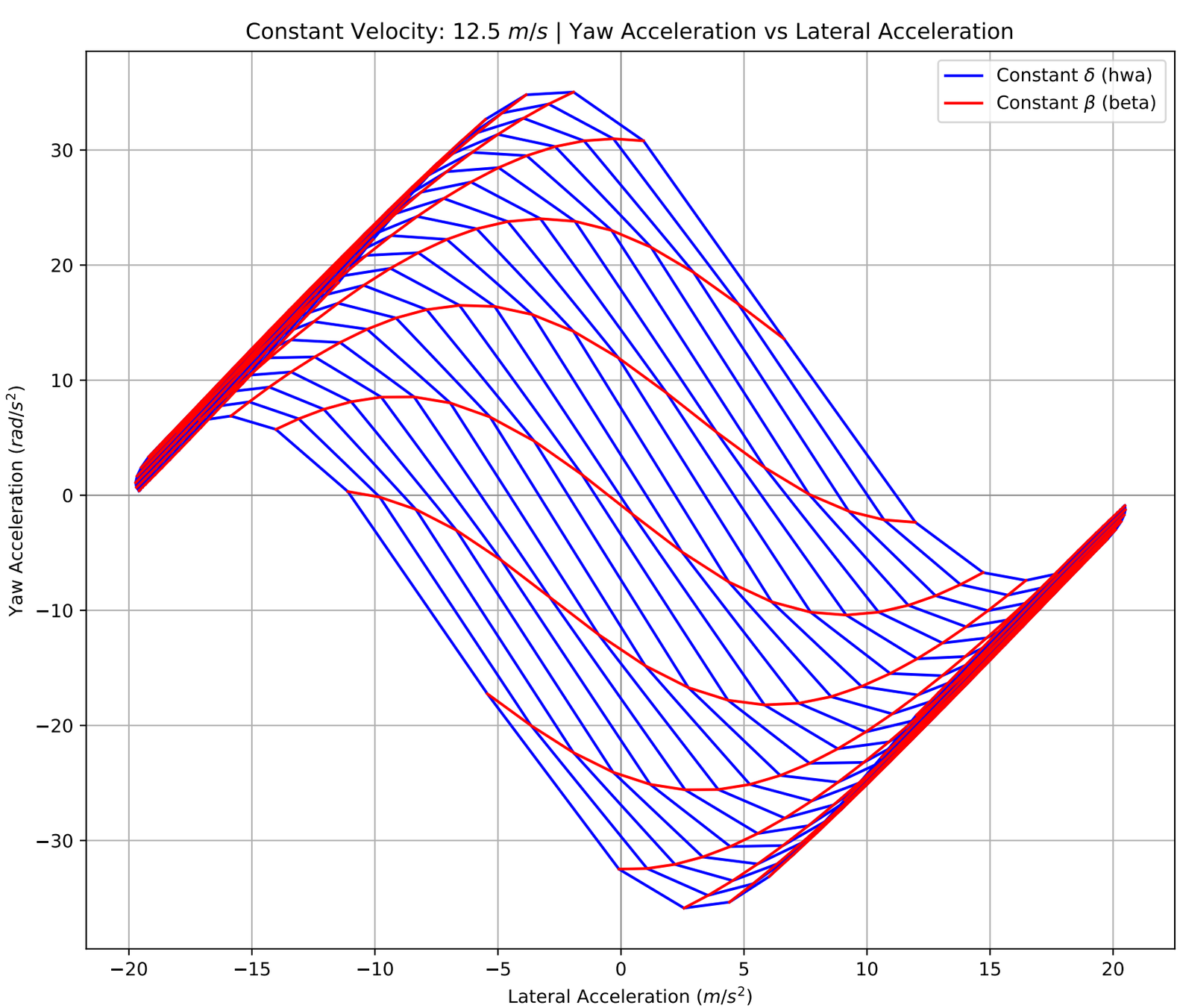

$\frac{d\ddot{\psi}}{d\beta}\Big|_{max(a_y)}$ vs Velocity (m/s)
$\frac{d\ddot{\psi}}{d\beta}\Big|_{max(a_y)}$
0.0
−0.1
−0.2
−0.3
−0.4
12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Velocity (m/s)


$\frac{d\ddot{\psi}}{d\delta}\Big|_{\beta=0}$ vs Velocity (m/s)
$\frac{d\ddot{\psi}}{d\delta}\Big|_{\beta=0}$
4
2
0
−2
−4
−6
12.5 15.0 17.5 20.0 22.5 25.0 27.5 30.0
Velocity (m/s)

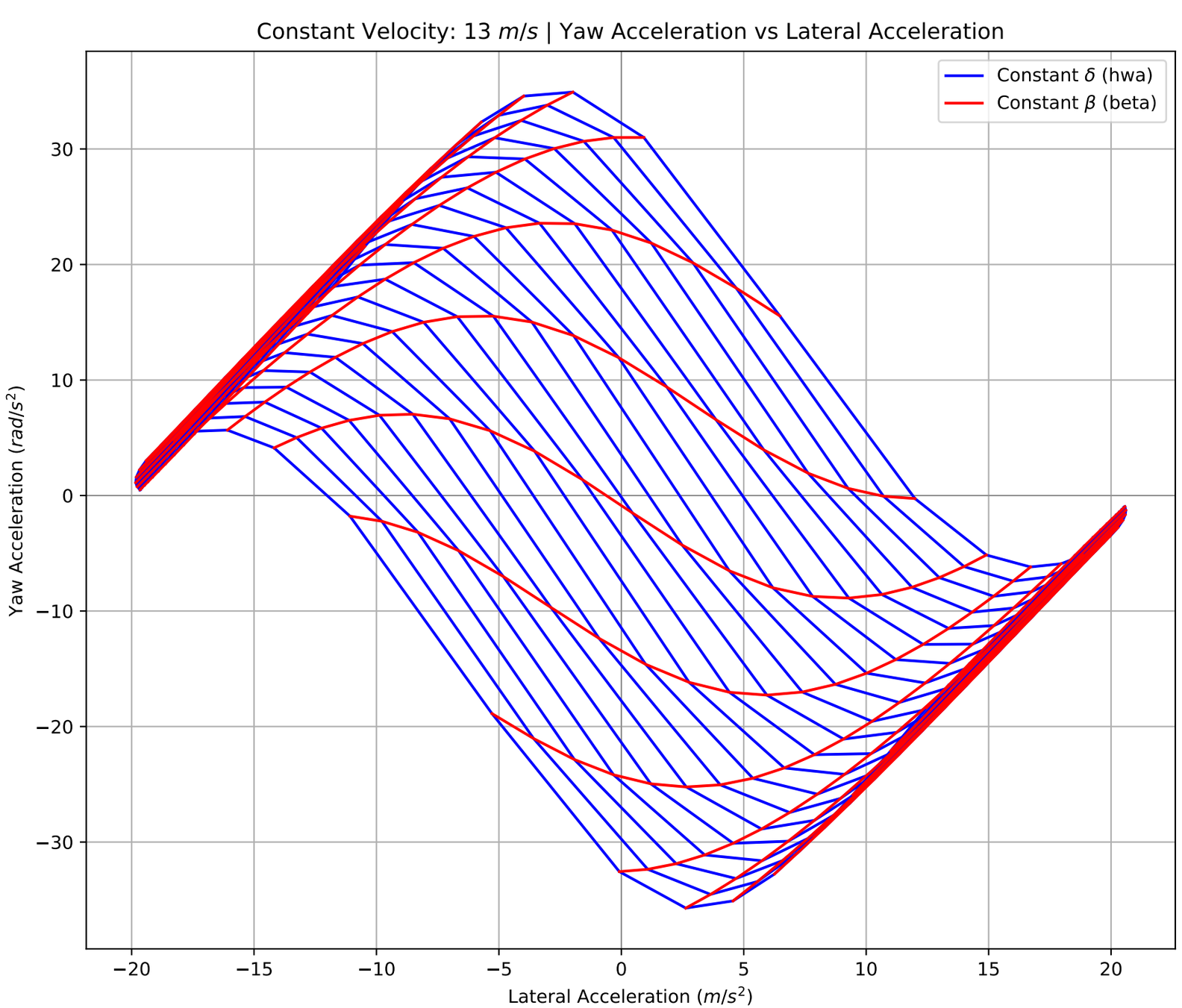

$\frac{d\ddot{\psi}}{d\beta}\Big|_{\delta=0}$ vs Velocity (m/s)
$\frac{d\ddot{\psi}}{d\beta}\Big|_{\delta=0}$
22.5
20.0
17.5
15.0
12.5
10.0
7.5
5.0
12.5
15.0
17.5
20.0
22.5
25.0
27.5
30.0
Velocity (m/s)



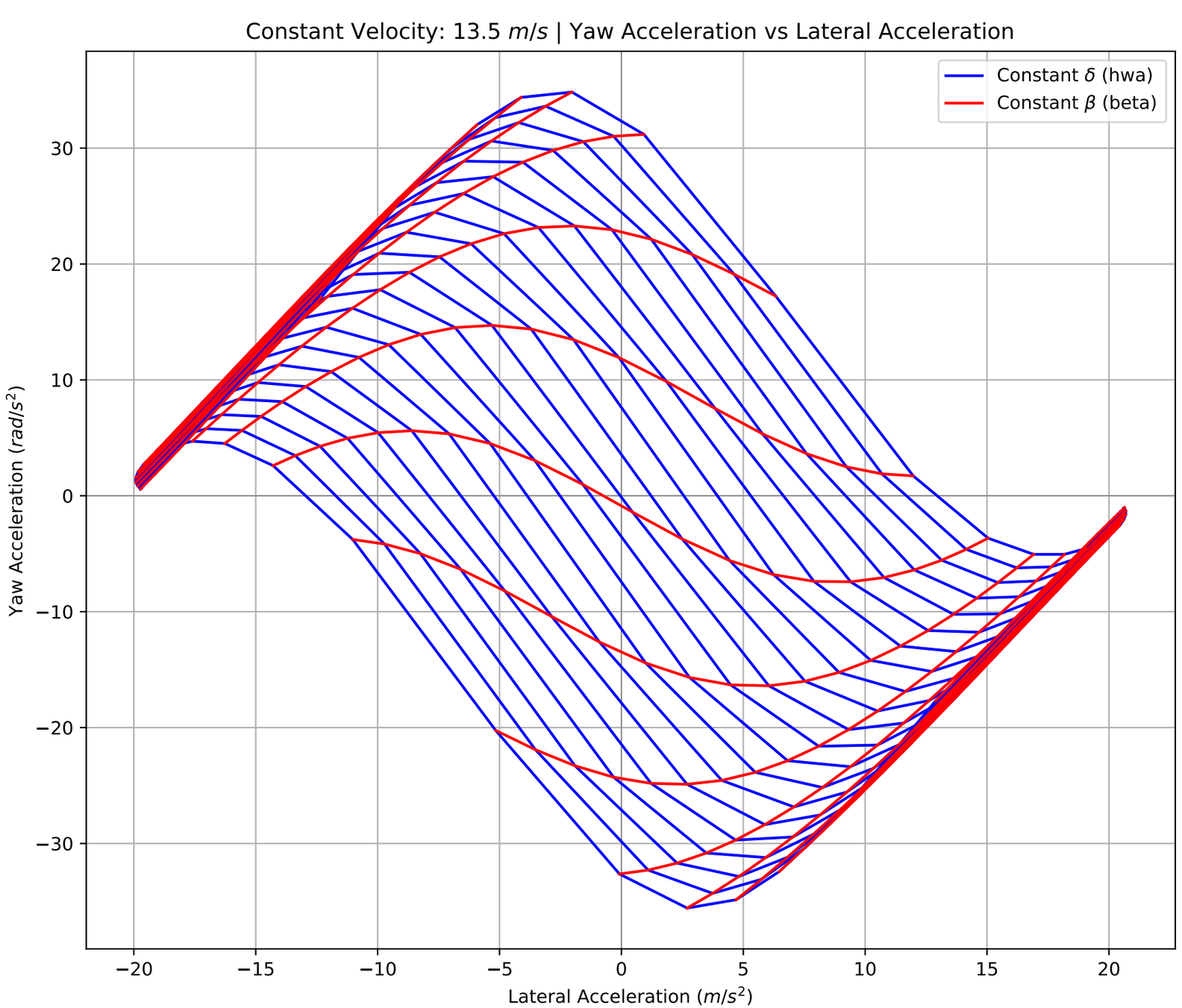
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-19.595	20.384
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.357	19.853
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	0.621	-0.859
$\beta\|_{max(a_y)}$	(deg)	9.000	-10.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-36.041	35.152
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.490	-1.874
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.144	0.135
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.415	-0.359
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-6.705
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		21.725



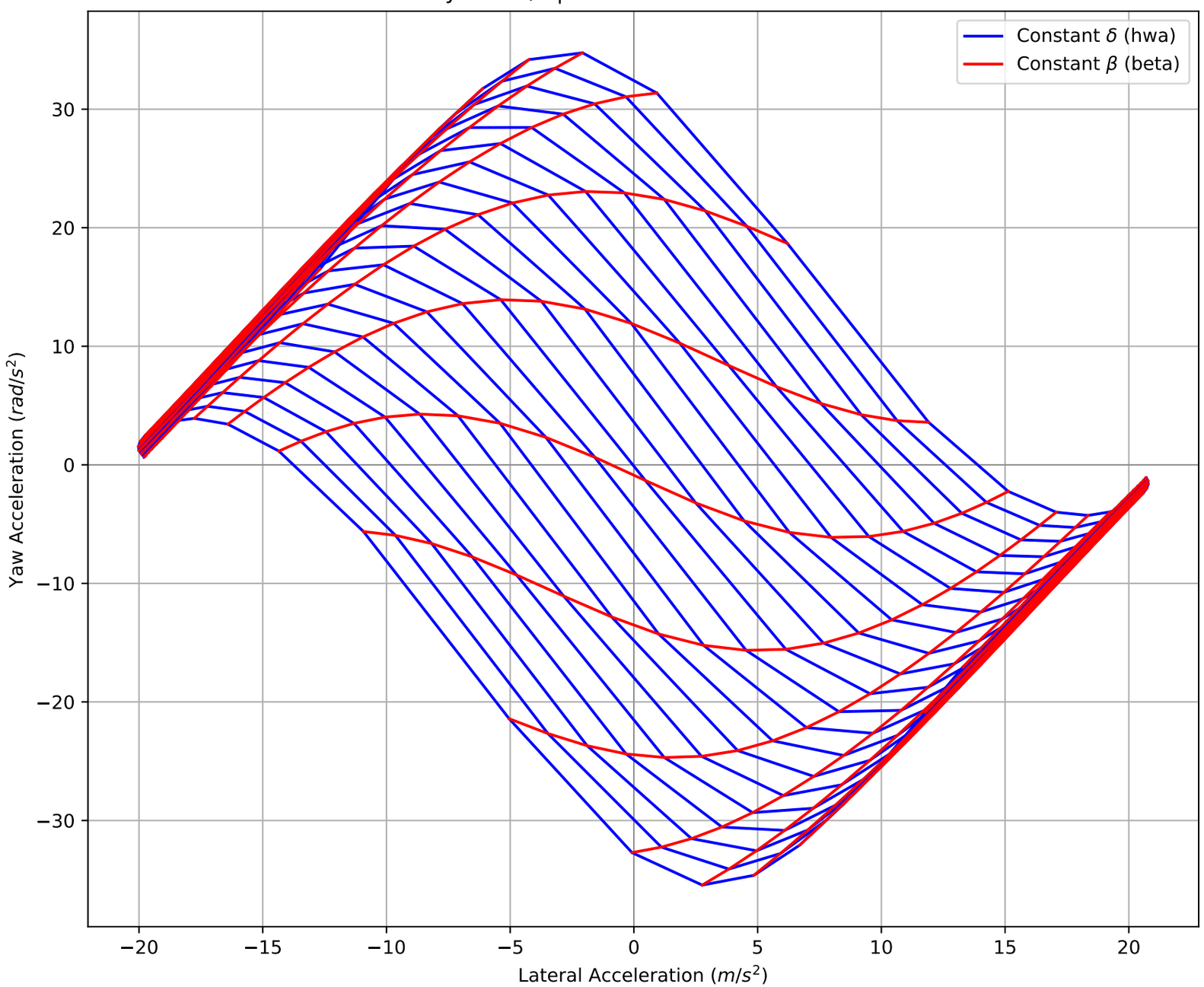
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-19.722	20.499
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.364	19.924
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.098	-1.257
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.871	35.033
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.562	-1.929
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.242	0.201
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.487	-0.403
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-5.686
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		20.509



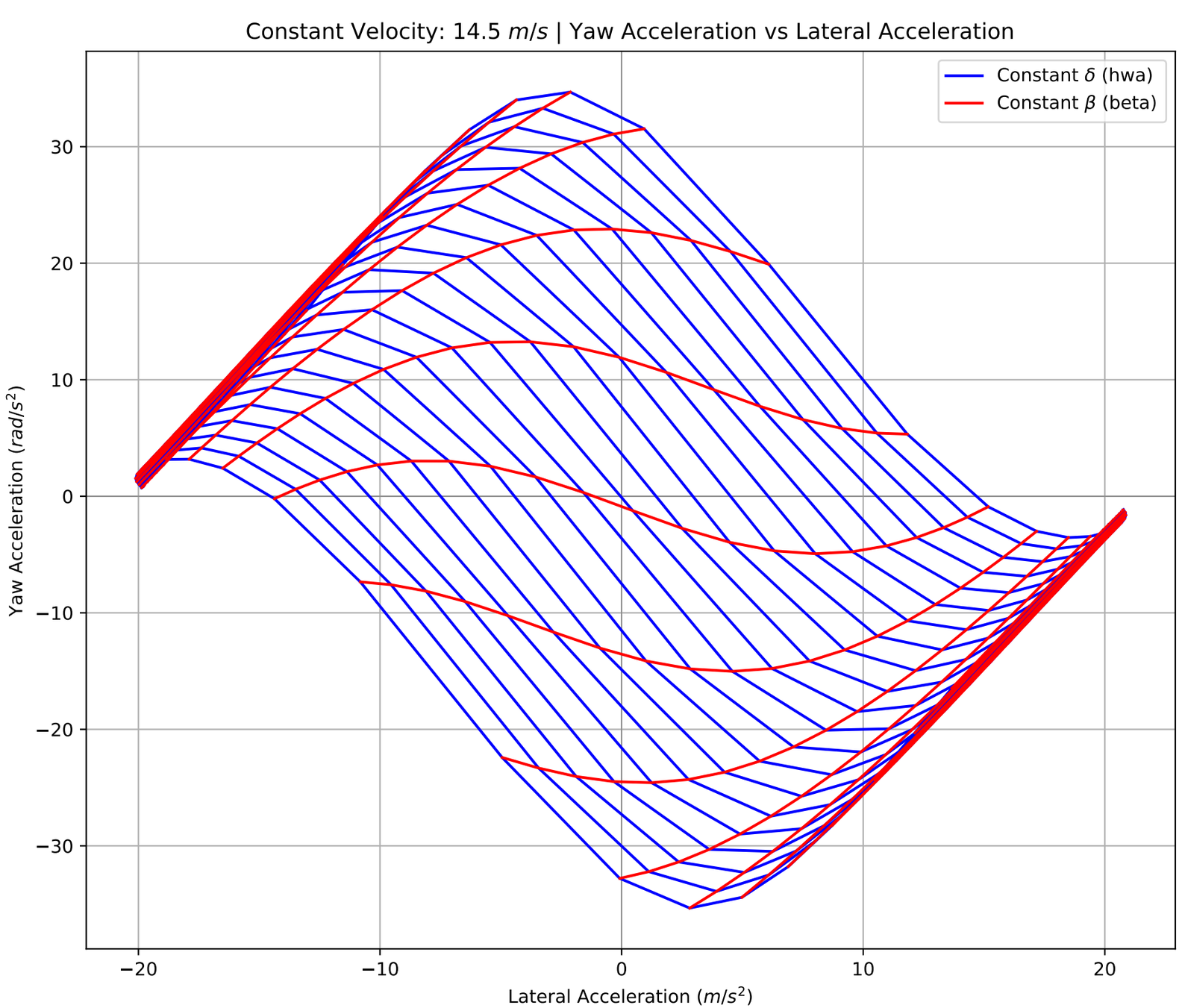
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-19.830	20.602
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.377	19.973
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.113	-1.268
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.716	34.927
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.631	-1.982
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.169	0.149
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.412	-0.348
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-4.782
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		19.366



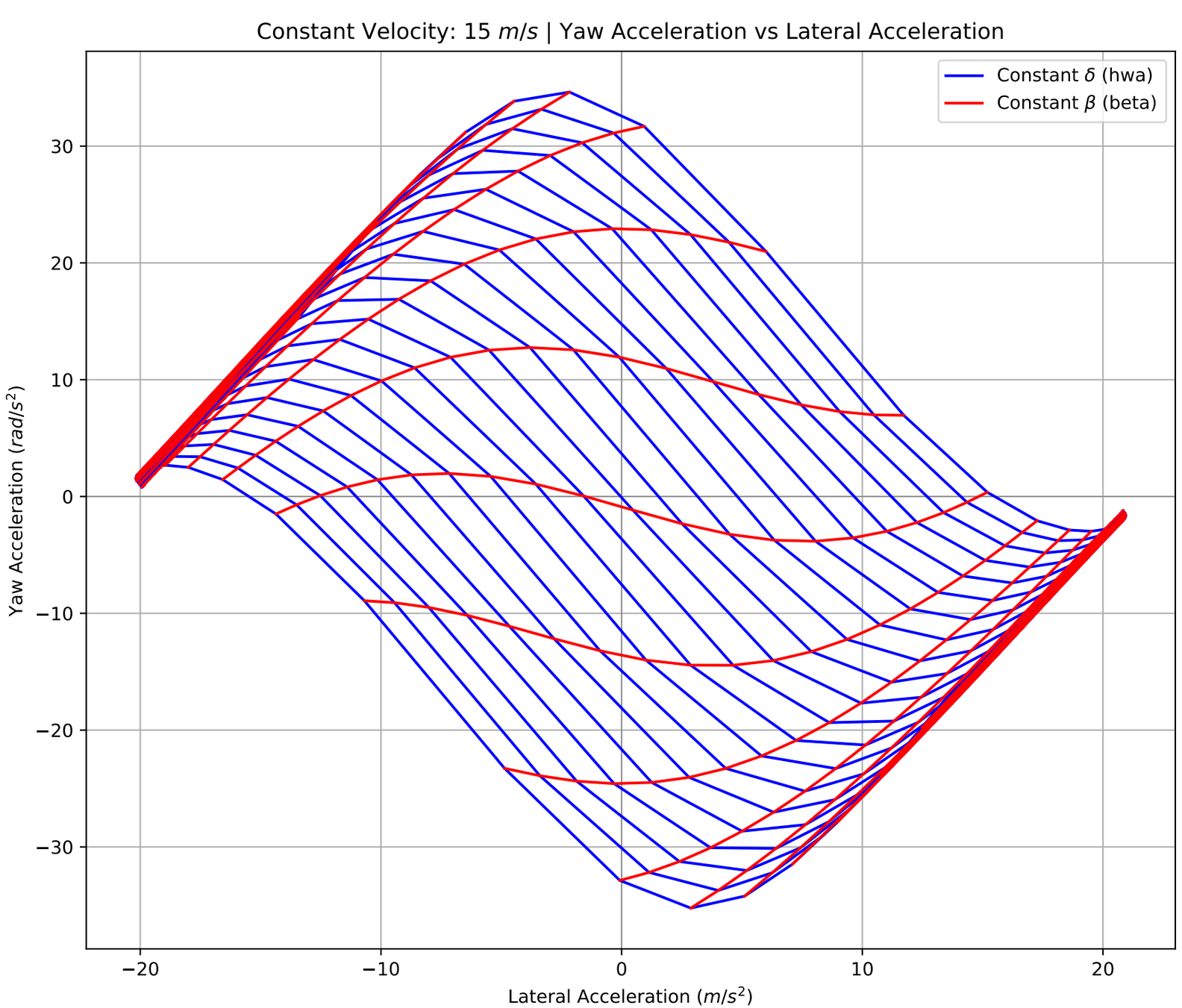
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-19.921	20.692
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.397	20.008
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.556	-1.293
$\beta\|_{max(a_y)}$	(deg)	7.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.576	34.834
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.697	-2.031
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.289	0.107
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.469	-0.302
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-3.976
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		18.296



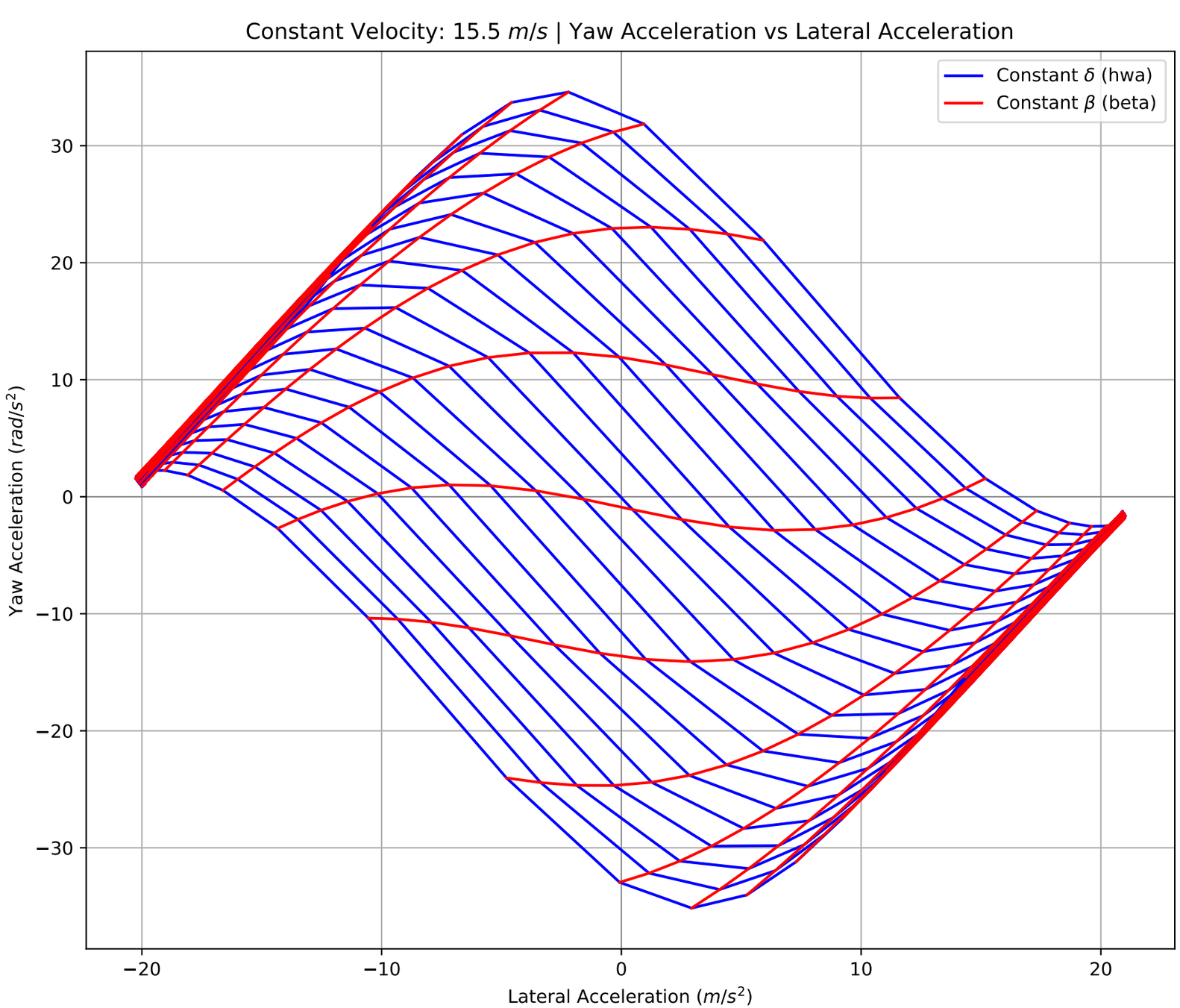
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.021	20.784
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.413	20.036
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.538	-1.621
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.450	34.754
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.759	-2.078
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.224	0.186
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.393	-0.328
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-3.253
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		17.297



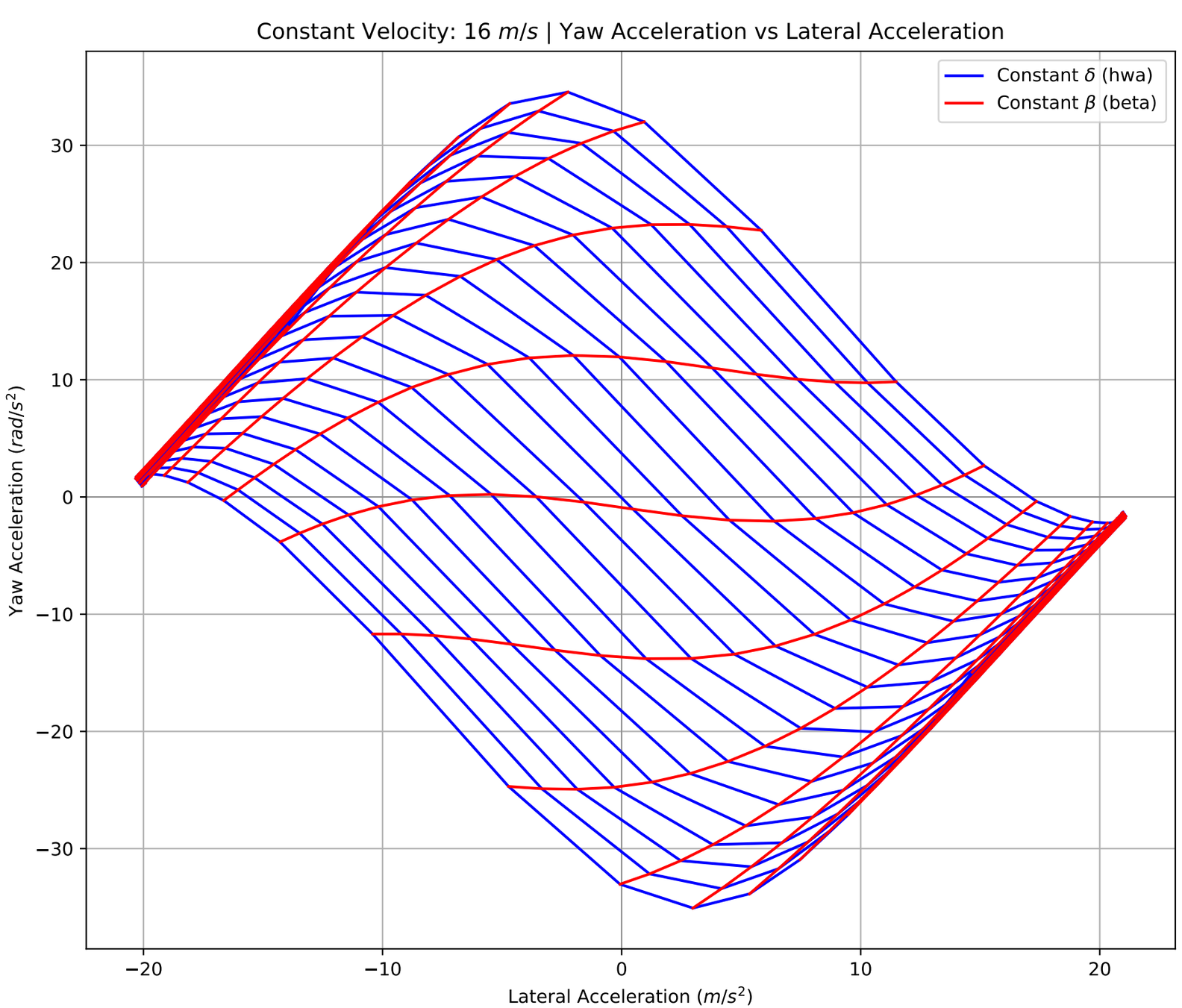
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.108	20.870
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.441	20.071
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.535	-1.619
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.338	34.685
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.818	-2.123
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.171	0.149
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.325	-0.280
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-2.604
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		16.364



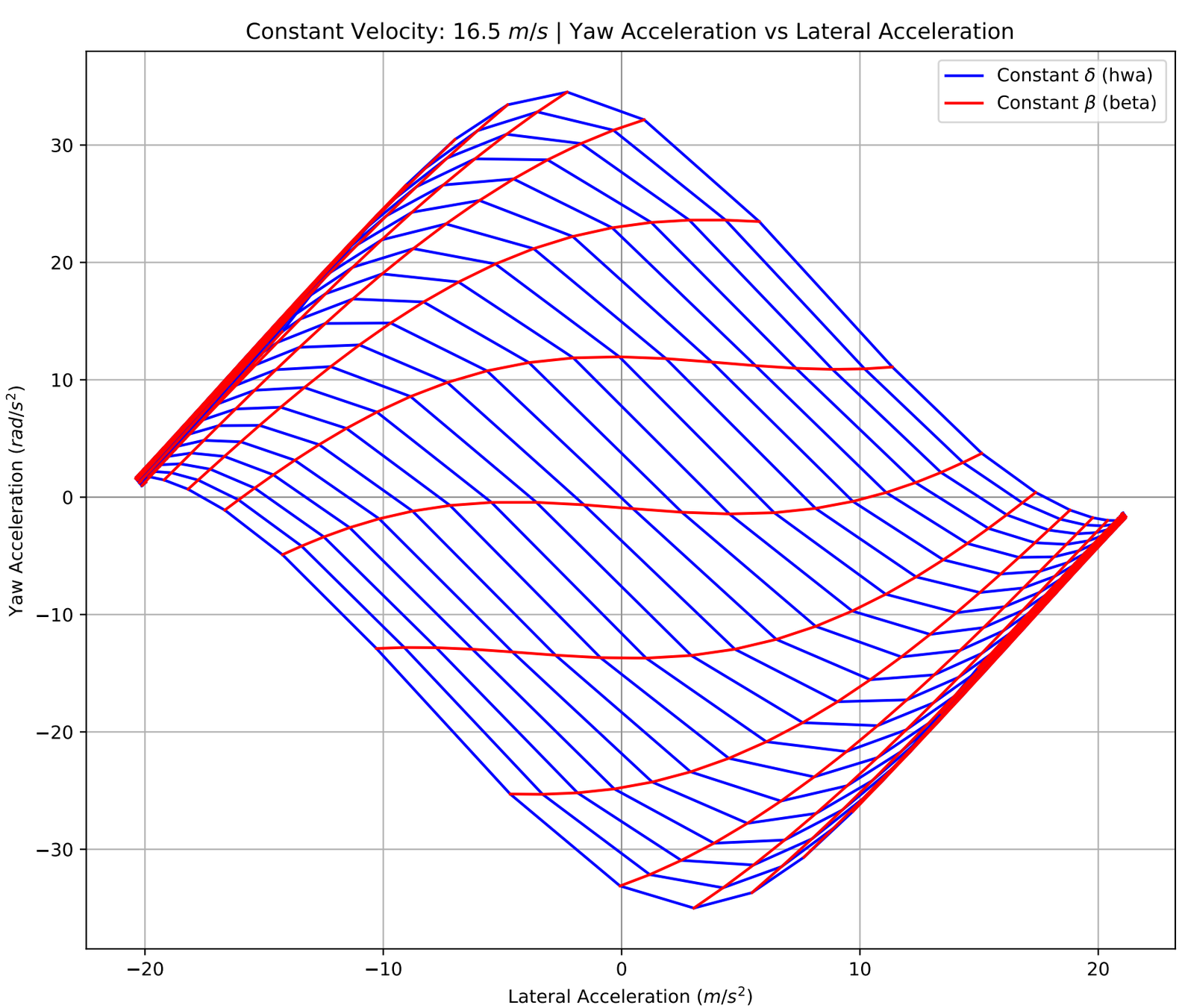
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.186	20.948
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.466	20.106
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.542	-1.624
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.238	34.627
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.875	-2.166
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.125	0.117
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.265	-0.237
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-2.017
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		15.496



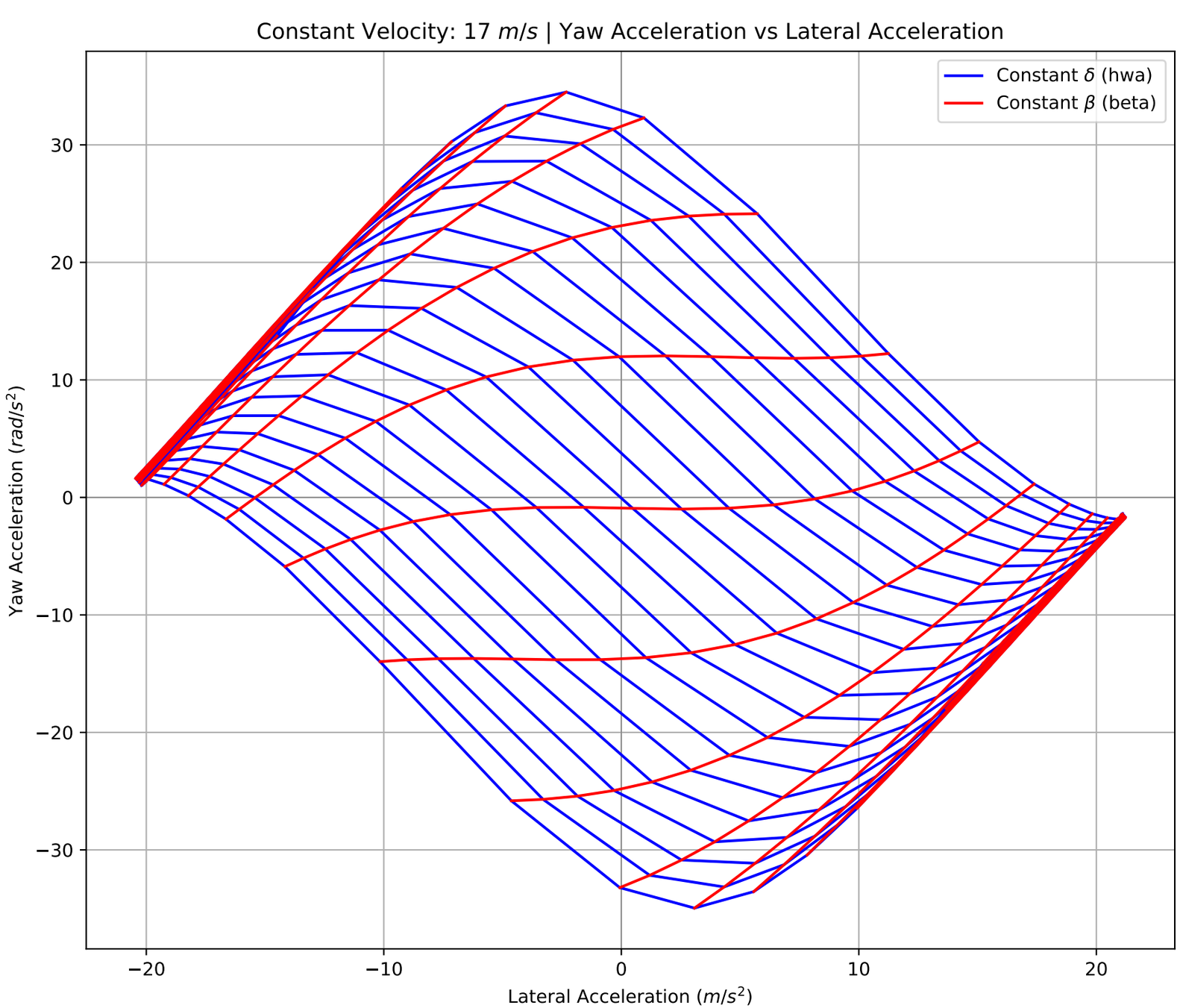
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.257	21.020
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.497	20.145
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.554	-1.634
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.150	34.579
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.929	-2.207
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.087	0.090
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.210	-0.198
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-1.485
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		14.688



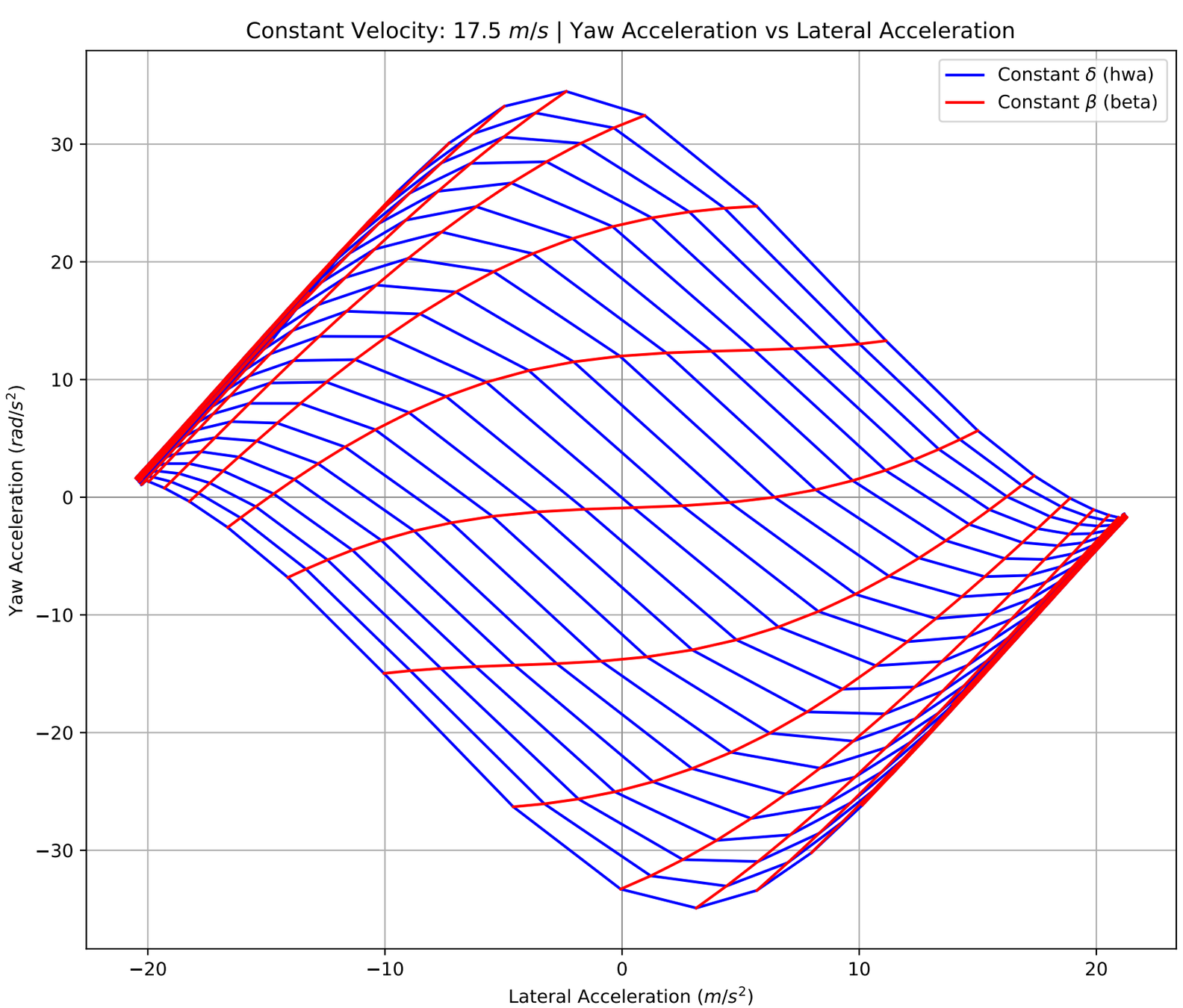
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.323	21.089
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.531	20.187
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.571	-1.647
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.073	34.542
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	2.981	-2.246
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.055	0.066
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.160	-0.162
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-1.001
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		13.937



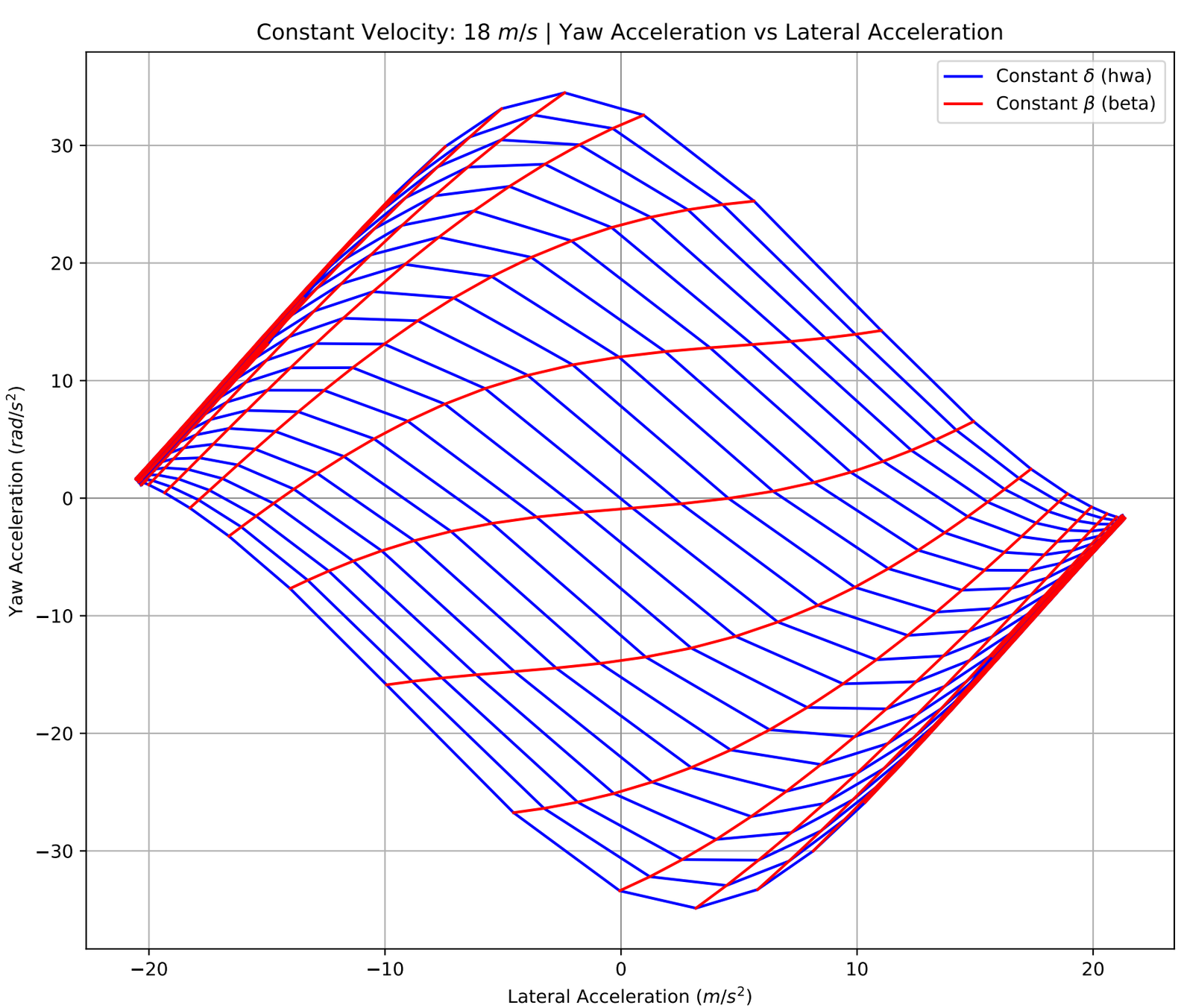
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.386	21.155
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.563	20.228
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.589	-1.661
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.007	34.513
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.031	-2.284
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.027	0.046
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.115	-0.130
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-0.560
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		13.238



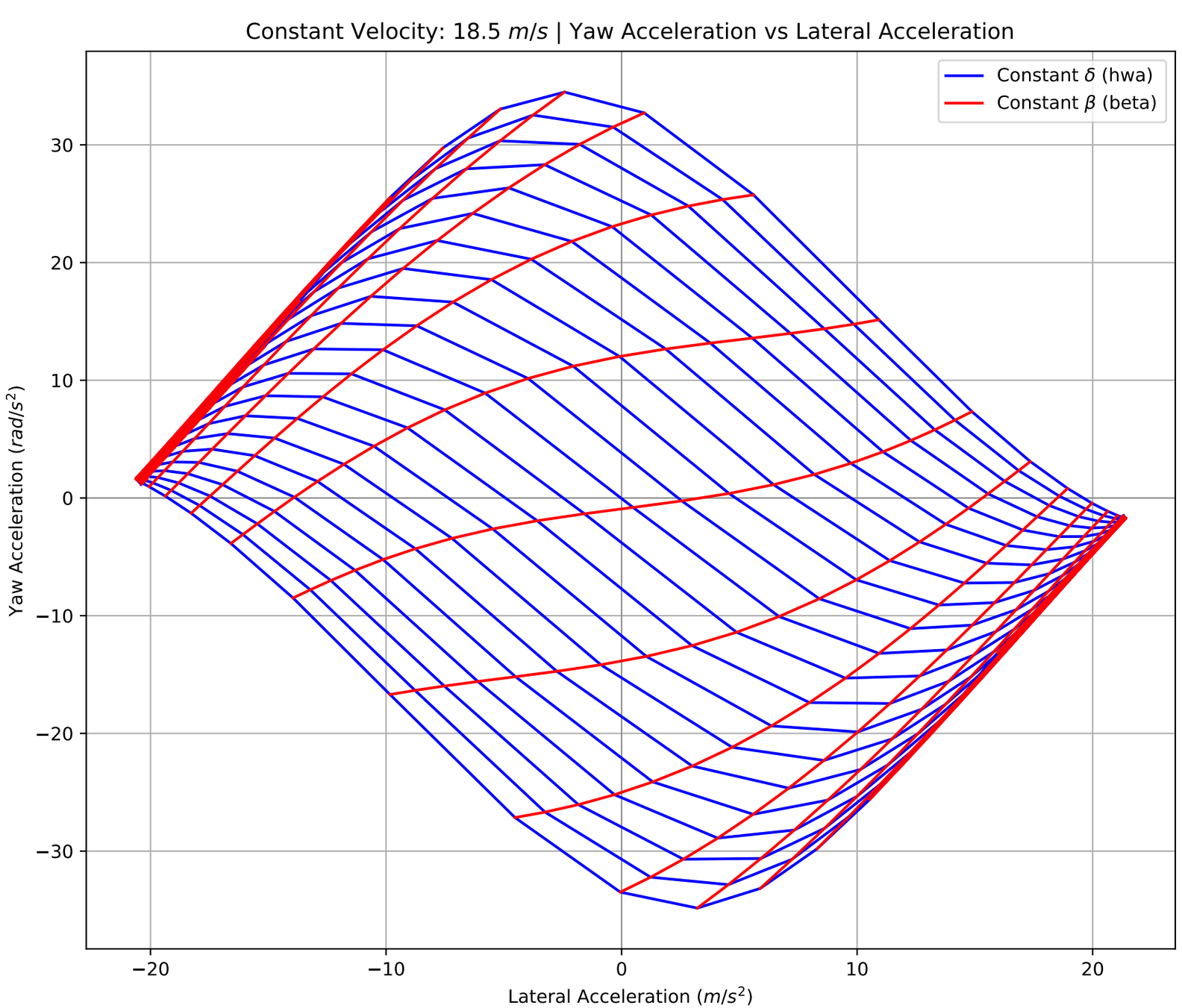
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.446	21.219
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.609	20.274
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.607	-1.677
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.952	34.494
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.079	-2.320
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.004	0.029
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.073	-0.100
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-0.155
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		12.587



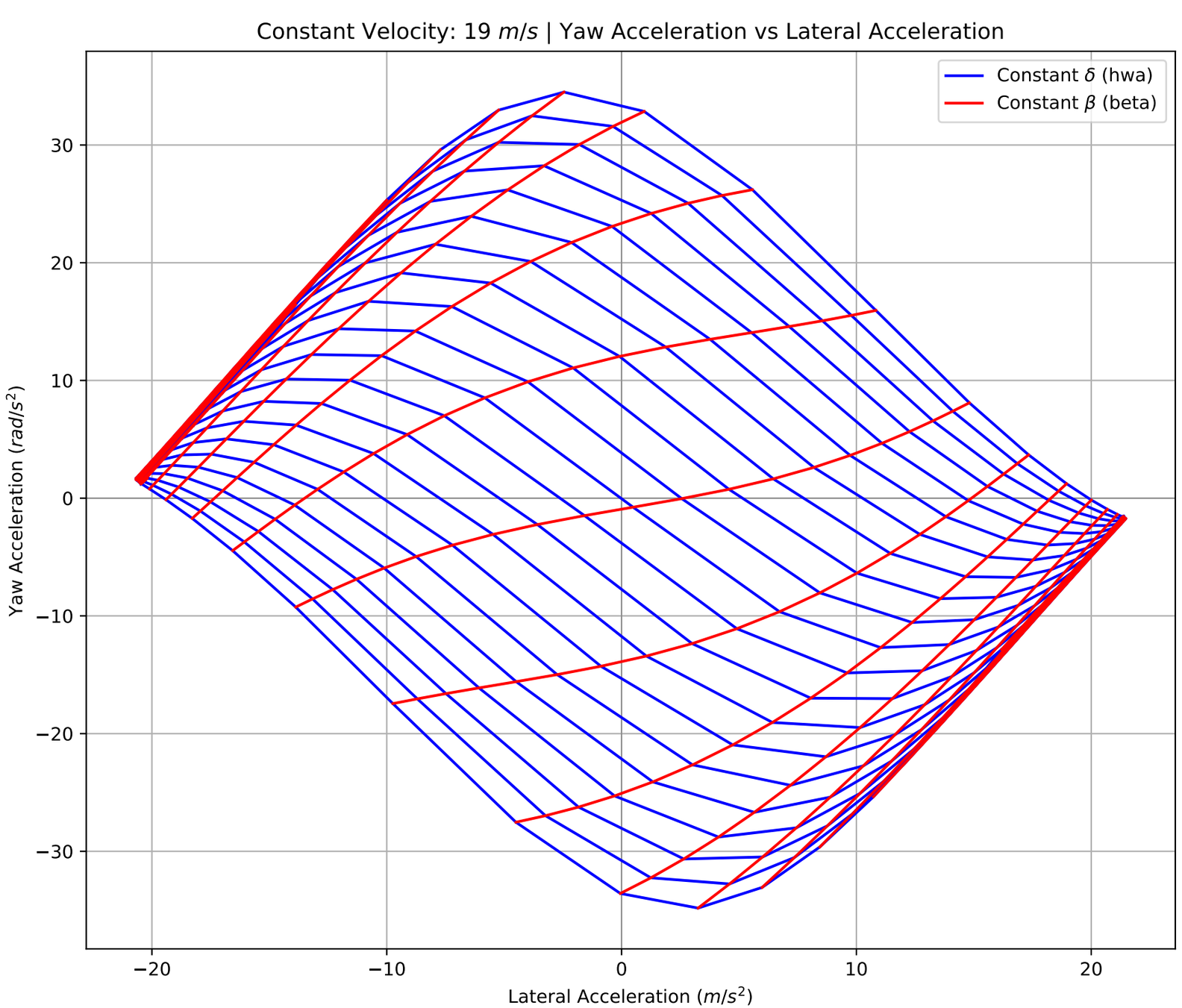
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.504	21.282
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.660	20.330
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.626	-1.692
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-25.000	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.906	34.483
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.126	-2.356
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.017	0.014
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.033	-0.072
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		0.217
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		11.983



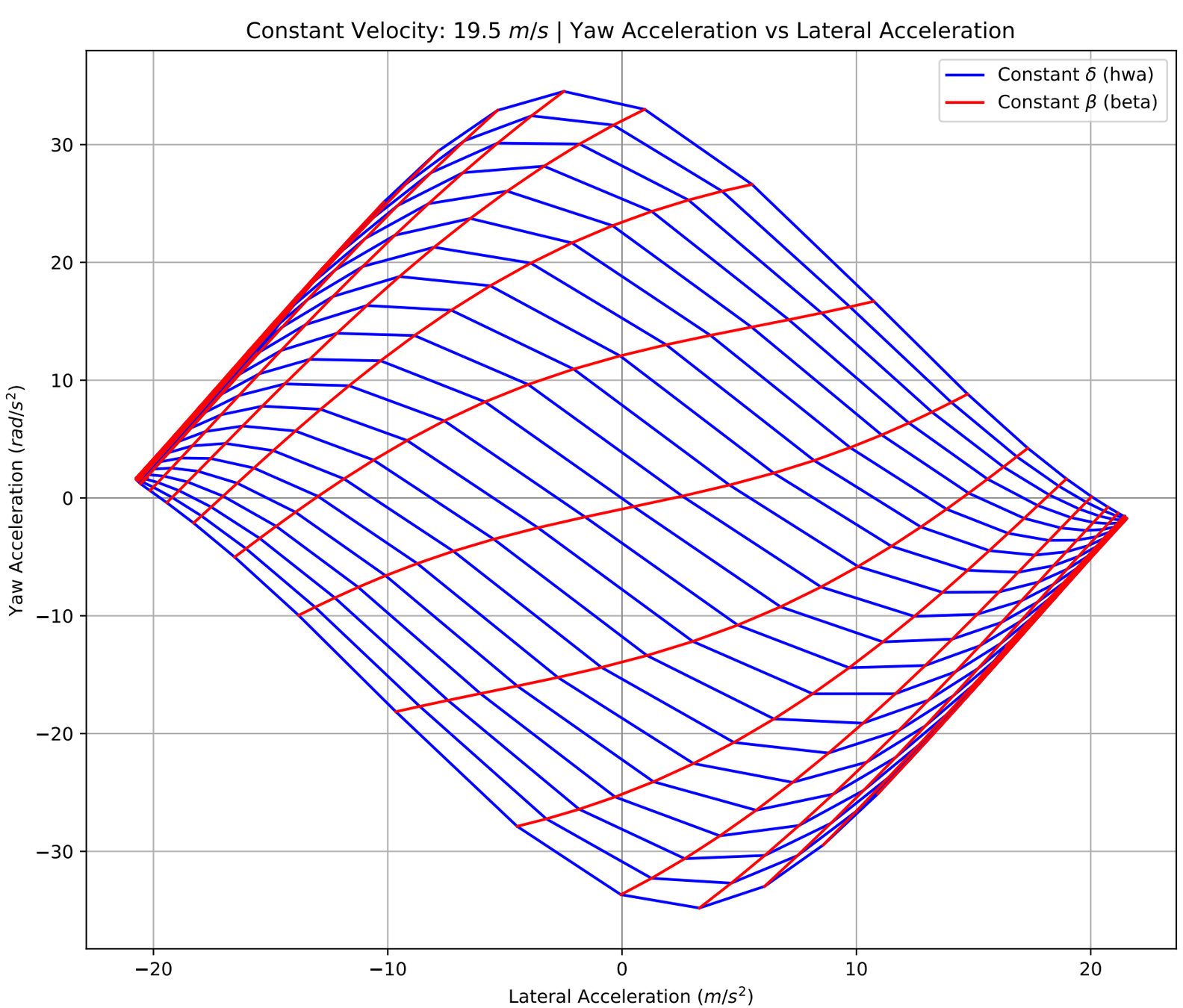
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.564	21.344
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.708	20.390
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.646	-1.707
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-22.500	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.869	34.480
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.171	-2.389
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.045	0.001
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.071	-0.046
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		0.559
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		11.420



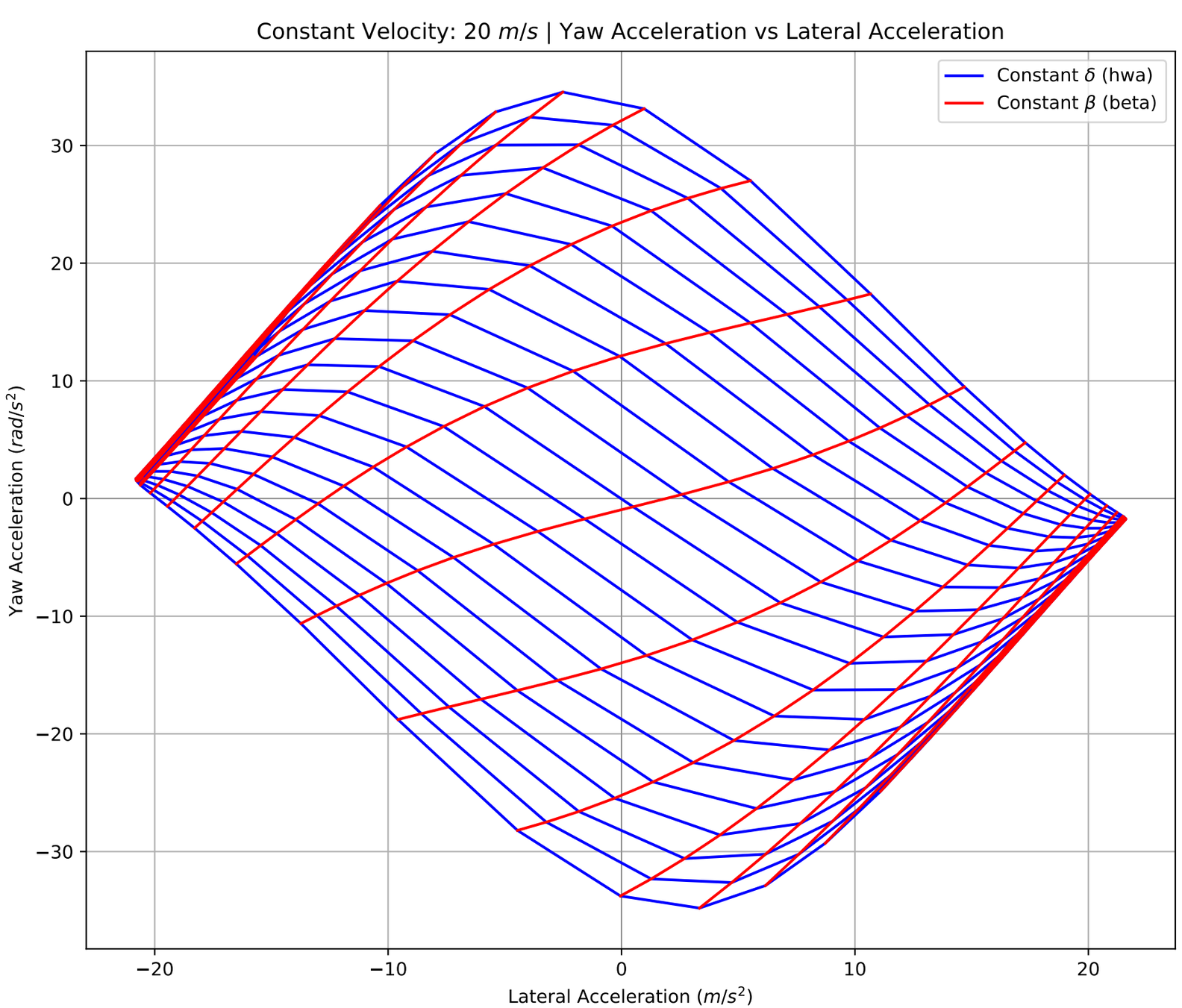
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.626	21.406
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.756	20.449
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.652	-1.723
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-22.500	25.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.841	34.485
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.215	-2.422
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.026	-0.011
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.032	-0.021
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		0.876
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		10.895



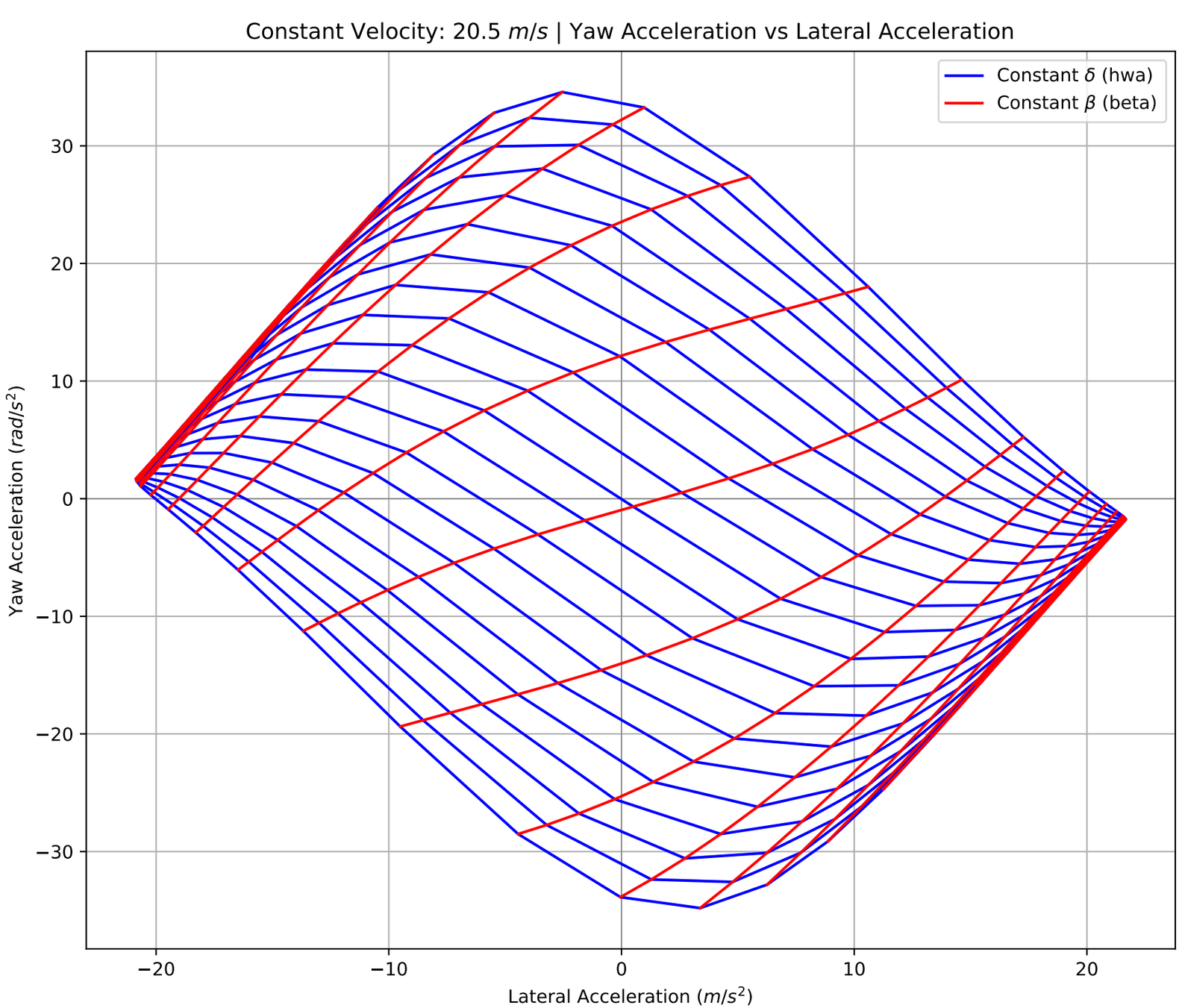
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.687	21.472
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.808	20.512
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.659	-1.740
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-22.500	22.500
$\max(\ddot{\psi})$	(rad/s^2)	-34.821	34.497
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.257	-2.454
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.009	0.032
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.004	-0.047
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		1.169
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		10.406



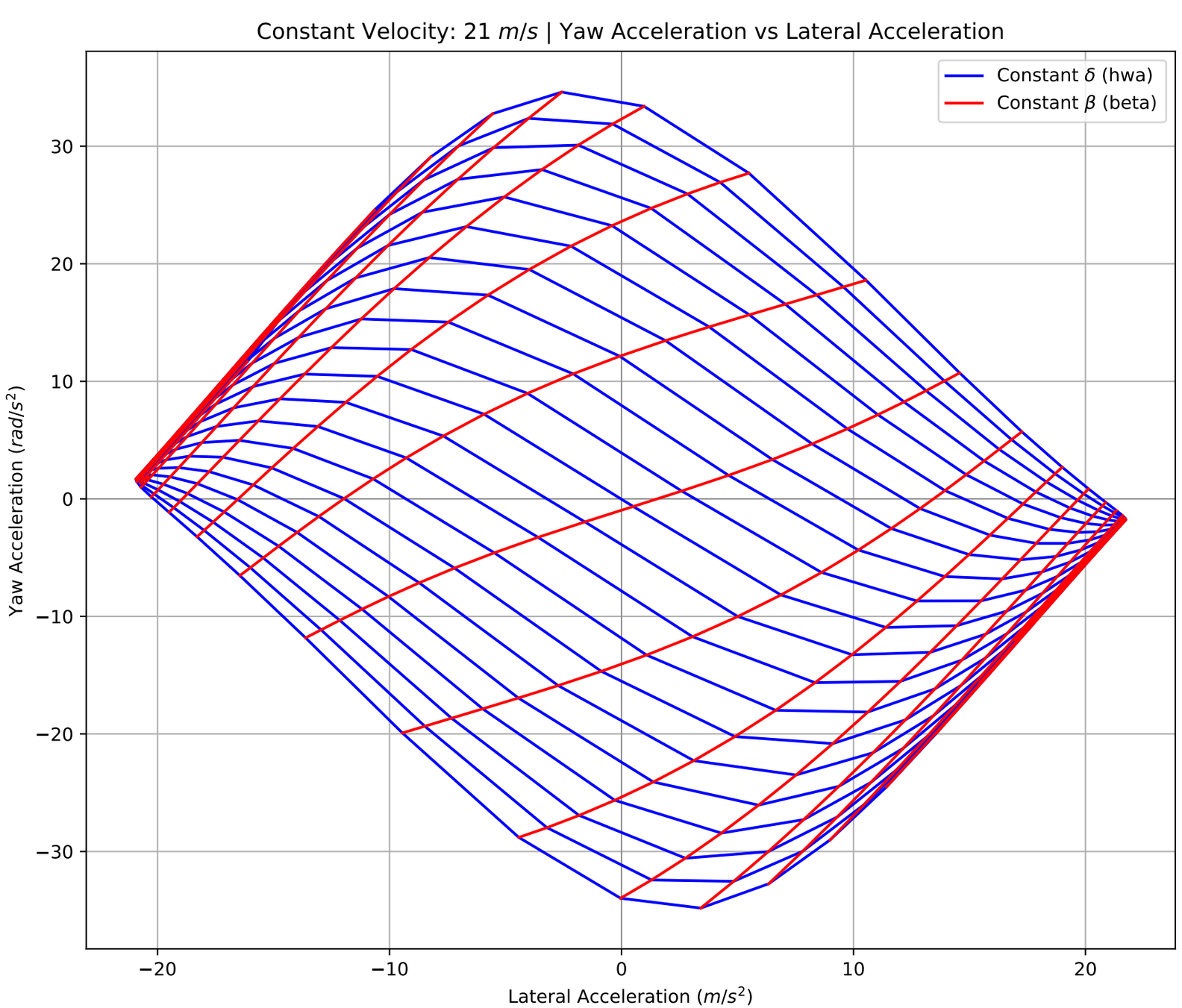
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.749	21.538
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.887	20.577
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.665	-1.748
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-22.500	22.500
$\max(\ddot{\psi})$	(rad/s^2)	-34.809	34.515
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.299	-2.485
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.006	0.021
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.038	-0.023
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		1.441
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		9.950



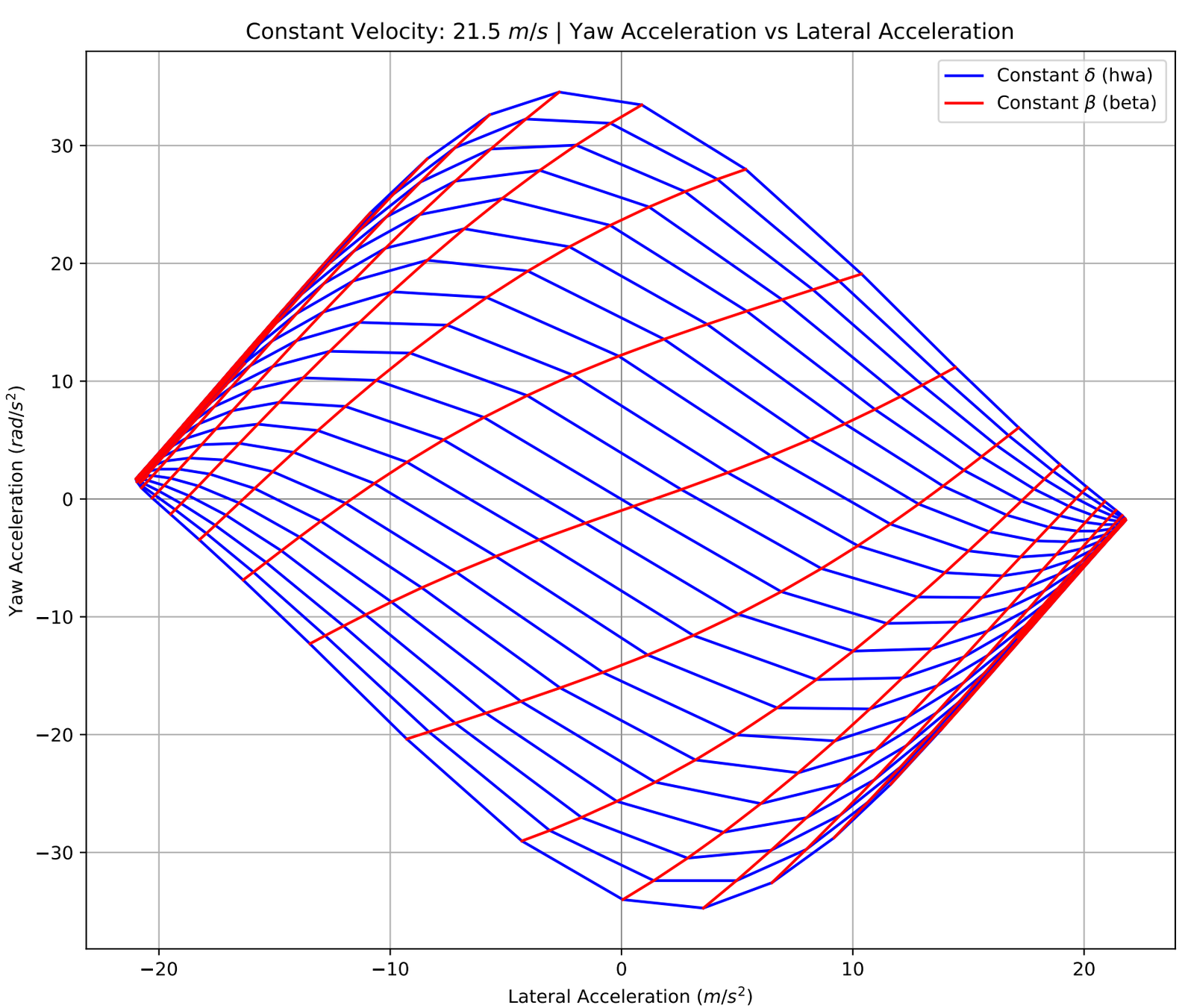
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.810	21.604
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-19.984	20.644
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.672	-1.755
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-22.500	22.500
$\max(\ddot{\psi})$	(rad/s^2)	-34.804	34.540
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.339	-2.515
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.020	0.011
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.070	-0.001
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		1.695
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		9.524



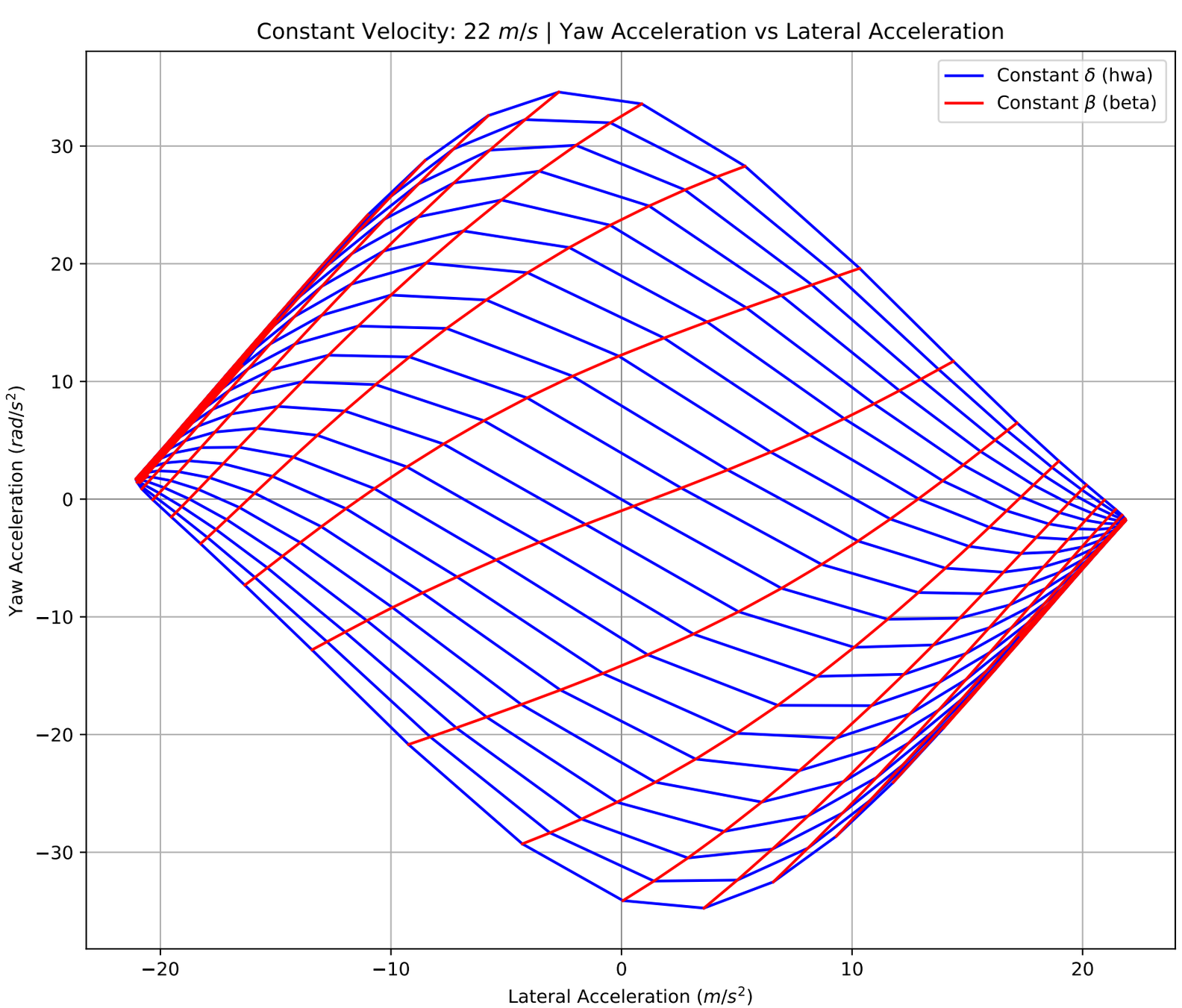
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.873	21.671
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.082	20.723
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.683	-1.763
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-20.000	22.500
$\max(\ddot{\psi})$	(rad/s^2)	-34.807	34.571
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.379	-2.545
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.051	0.003
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.025	0.021
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		1.932
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		9.126



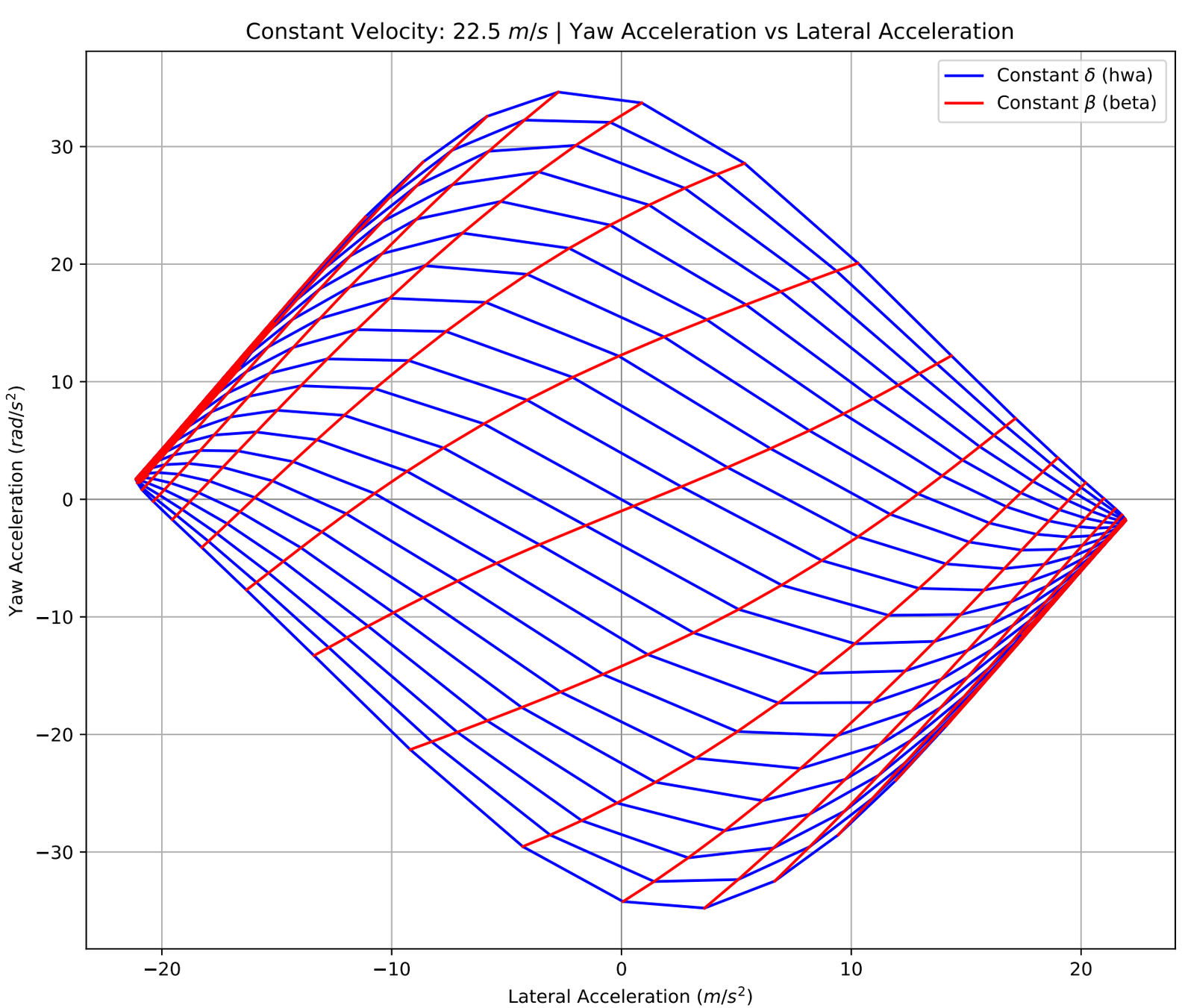
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-20.939	21.739
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.181	20.813
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.681	-1.771
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-20.000	22.500
$\max(\ddot{\psi})$	(rad/s^2)	-34.815	34.608
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.417	-2.574
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.038	-0.005
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.057	0.041
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		2.153
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		8.754



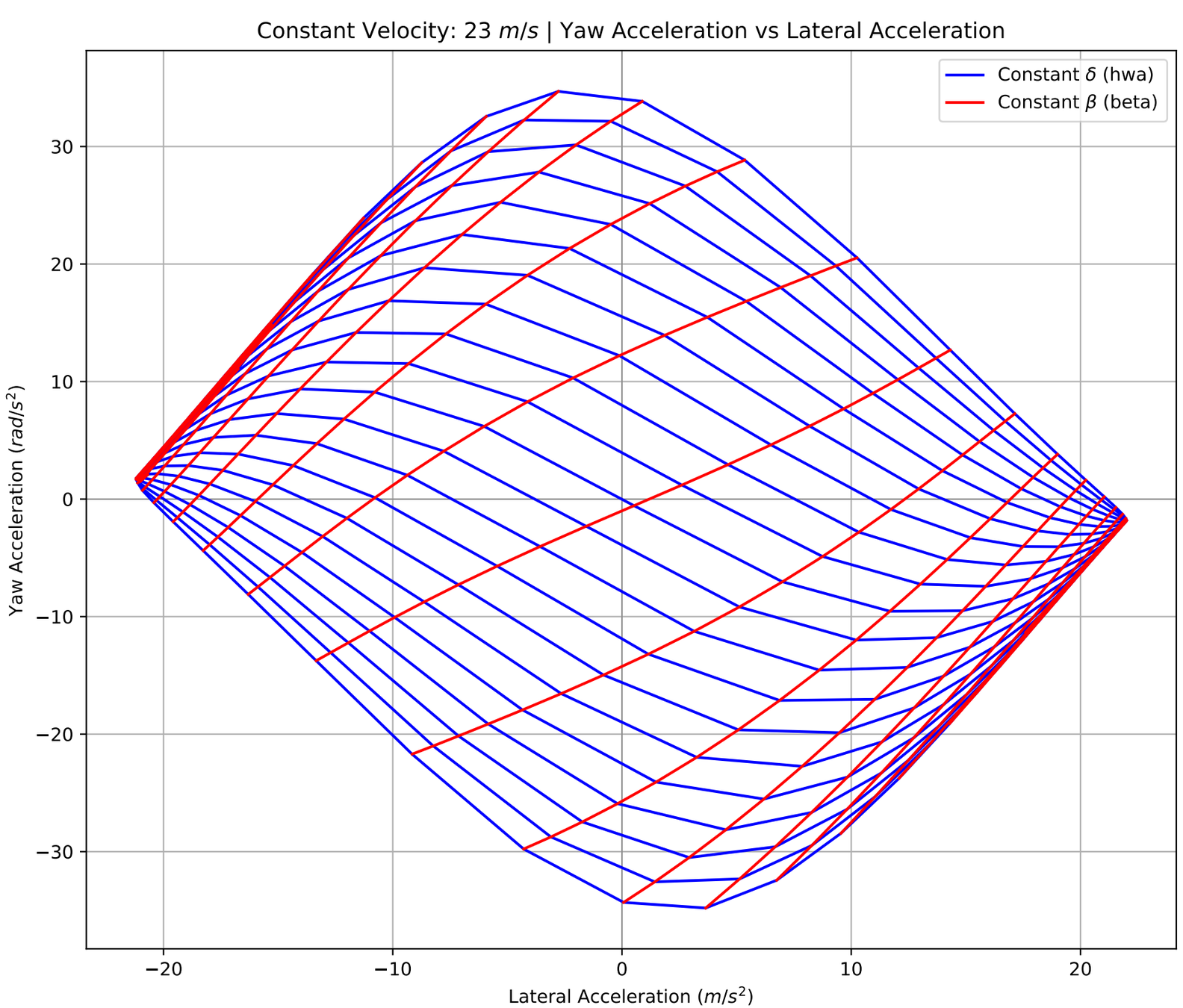
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.001	21.804
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.247	20.875
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.690	-1.789
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-20.000	22.500
$\max(\ddot{\psi})$	(rad/s^2)	-34.724	34.538
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.539	-2.692
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.038	-0.005
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.074	0.052
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		2.359
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		8.411



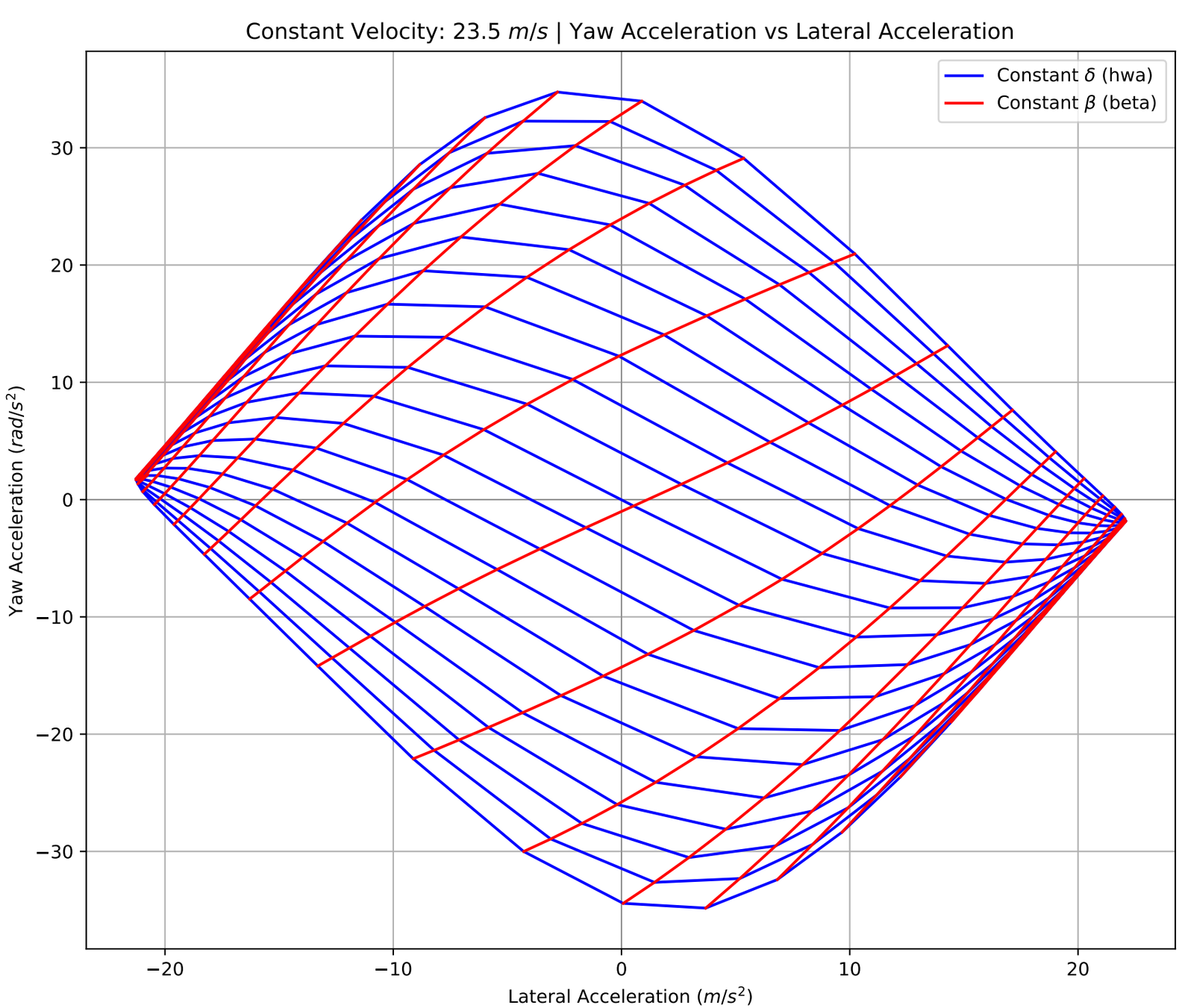
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.068	21.873
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.359	20.970
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.688	-1.804
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-20.000	20.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.743	34.584
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.577	-2.721
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.027	0.043
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.104	0.019
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		2.554
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		8.084



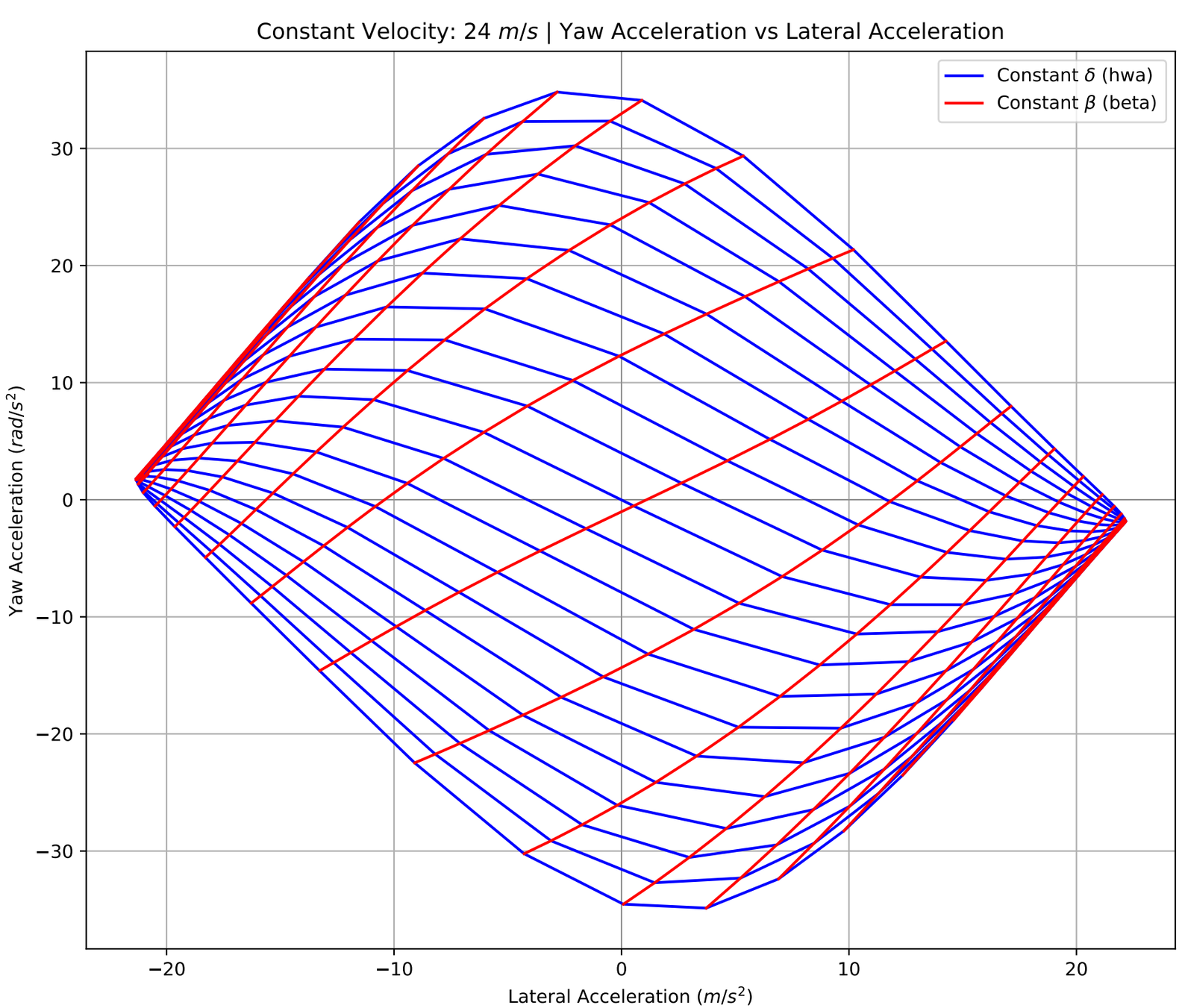
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.136	21.946
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.465	21.062
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.686	-1.807
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-20.000	20.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.768	34.634
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.615	-2.749
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.017	0.036
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.132	0.039
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		2.738
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		7.777



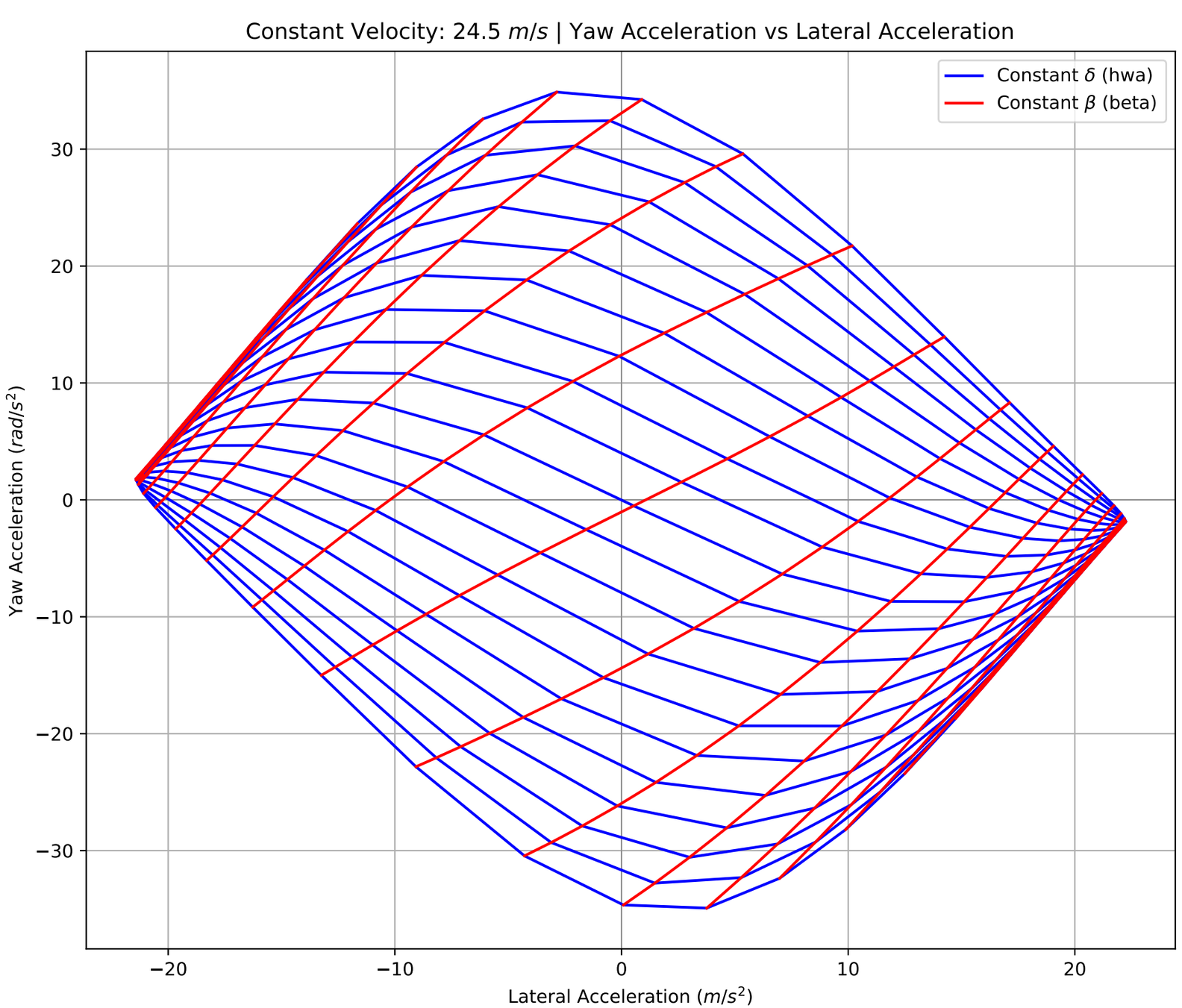
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.205	22.019
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.565	21.165
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.684	-1.809
$\beta\|_{max(a_y)}$	(deg)	7.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-20.000	20.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.798	34.689
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.652	-2.777
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.007	0.030
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.159	0.057
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		2.911
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		7.489



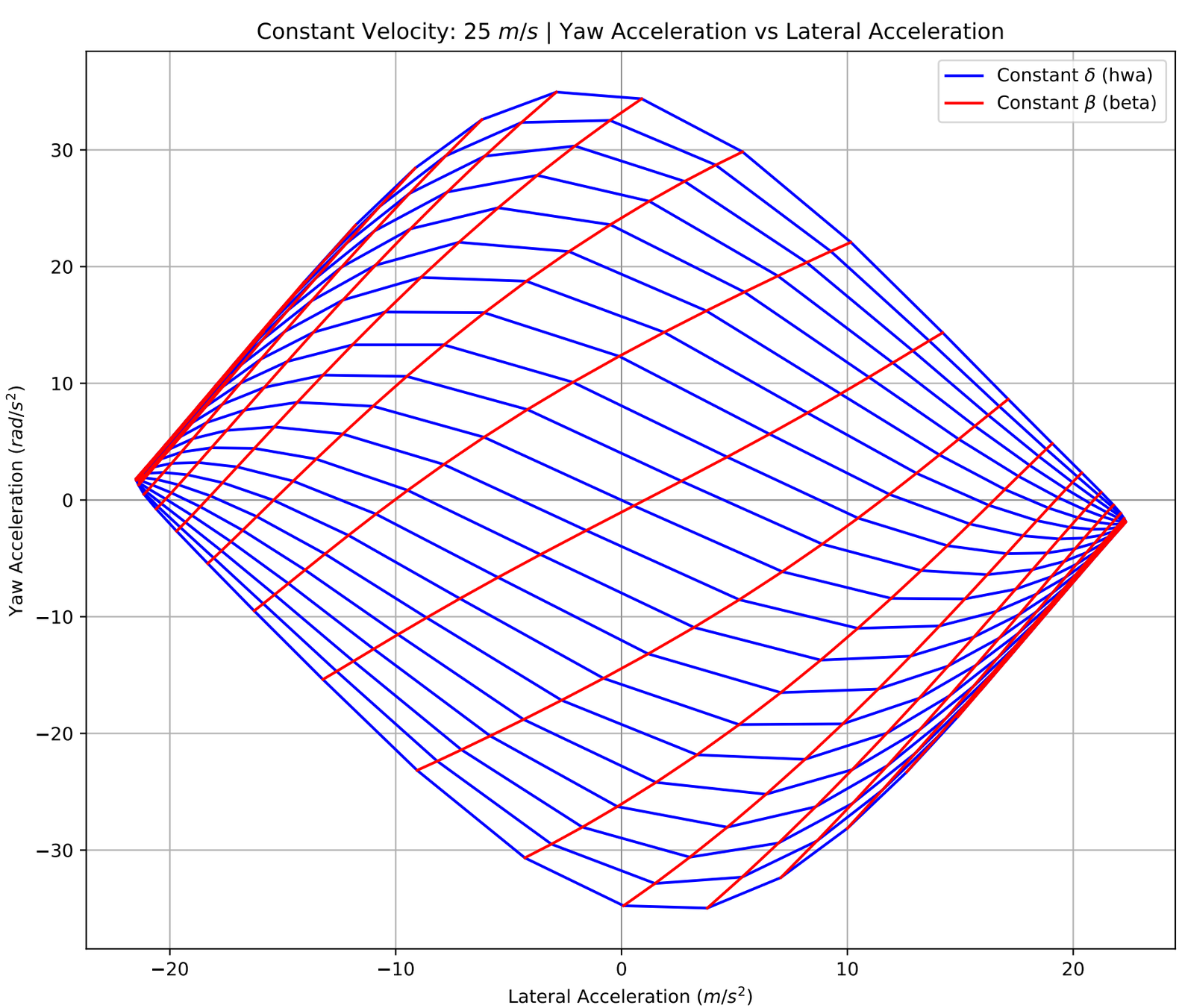
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.279	22.093
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.661	21.266
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.761	-1.812
$\beta\|_{max(a_y)}$	(deg)	8.000	-8.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	20.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.833	34.749
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.688	-2.804
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.037	0.024
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.057	0.075
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.075
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		7.218



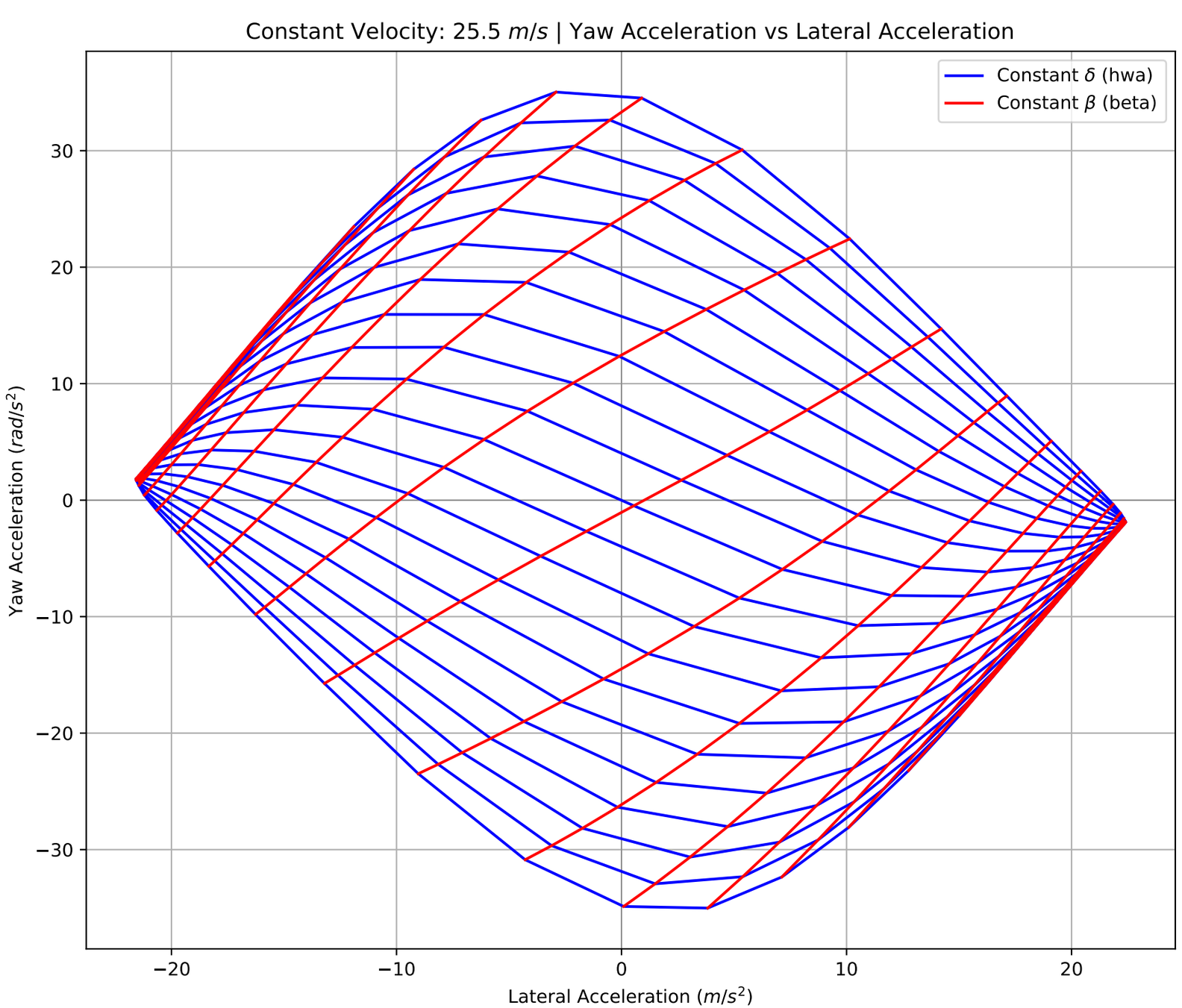
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.355	22.169
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.754	21.366
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.771	-1.861
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.873	34.813
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.725	-2.831
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.029	0.044
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.038	-0.069
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.230
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		6.962



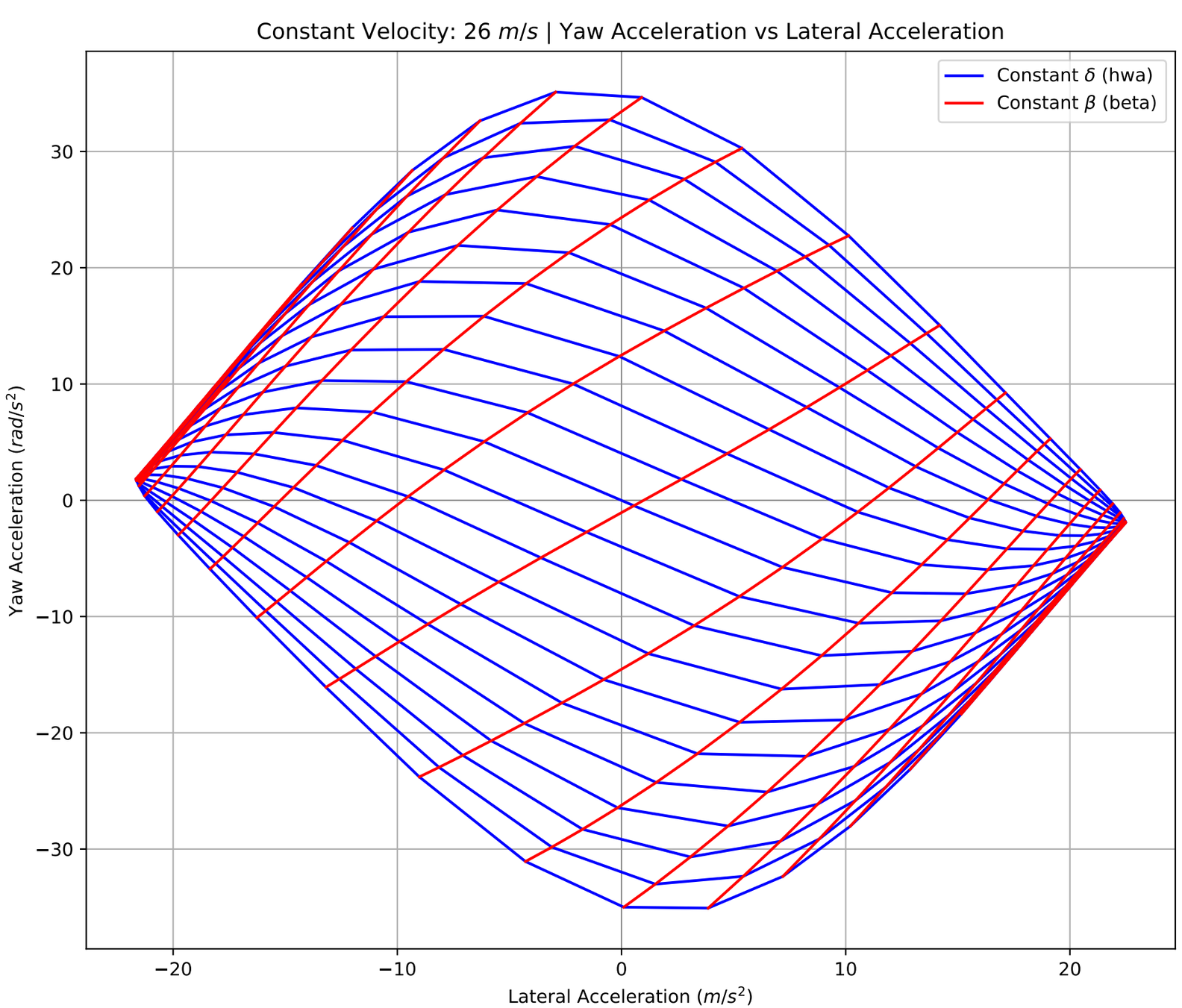
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.431	22.248
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.845	21.470
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.781	-1.872
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.918	34.882
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.761	-2.858
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.021	0.039
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.020	-0.056
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.378
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		6.722



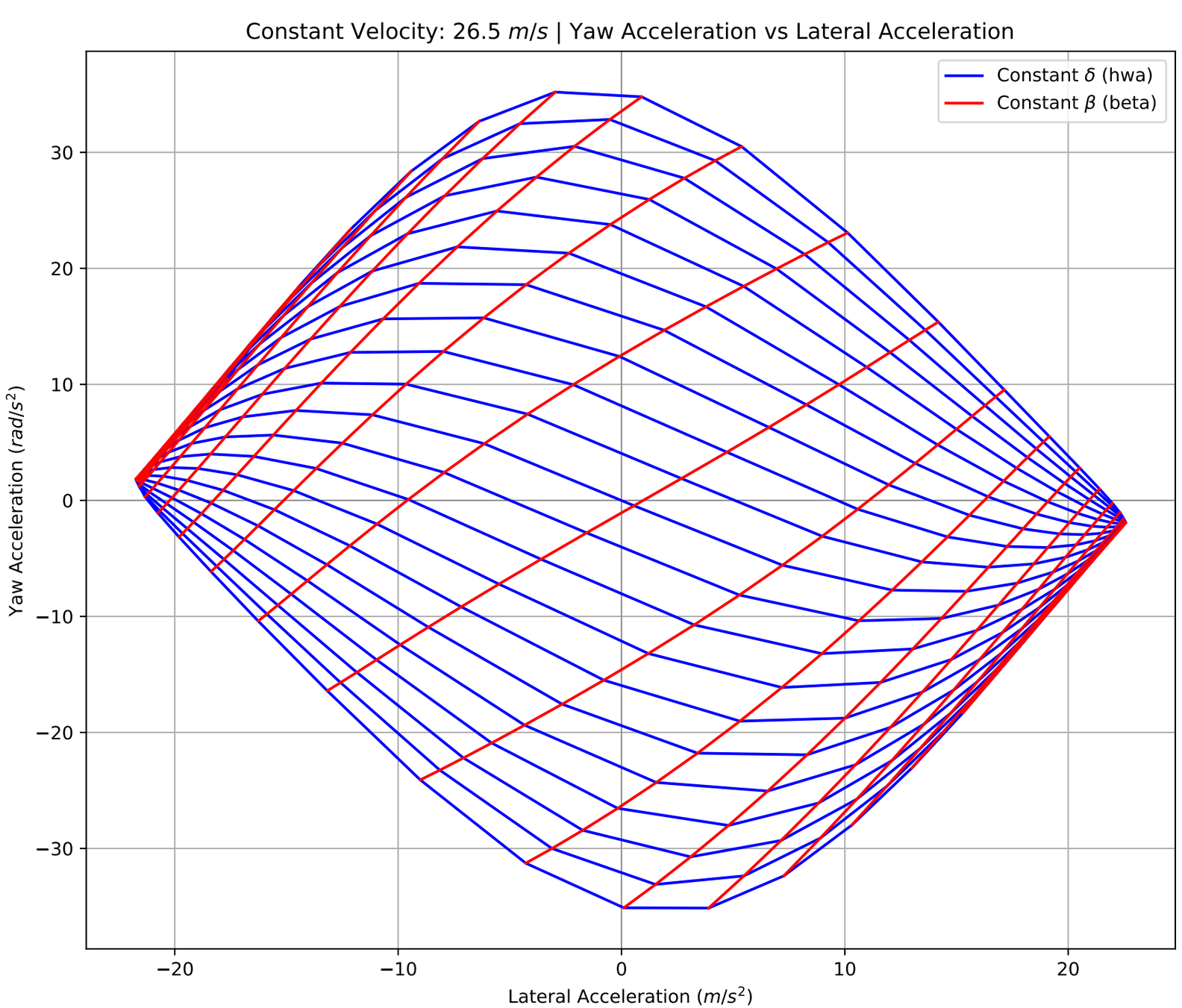
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.508	22.329
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-20.935	21.571
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.792	-1.884
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-34.967	34.954
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.796	-2.884
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.014	0.034
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.003	-0.043
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.518
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		6.495



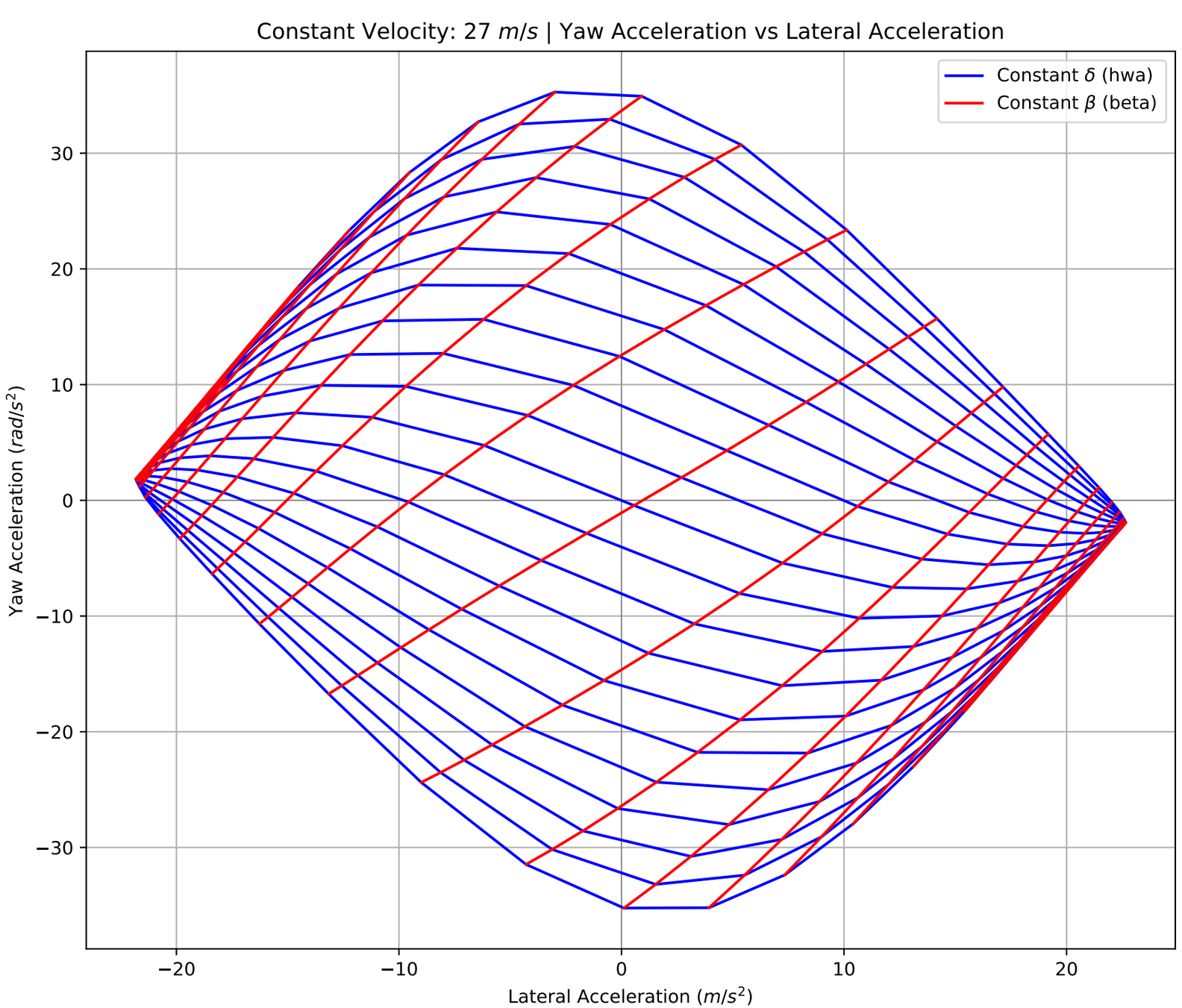
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.586	22.411
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.024	21.670
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.802	-1.895
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.020	35.031
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.832	-2.910
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.008	0.030
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.014	-0.032
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.651
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		6.280



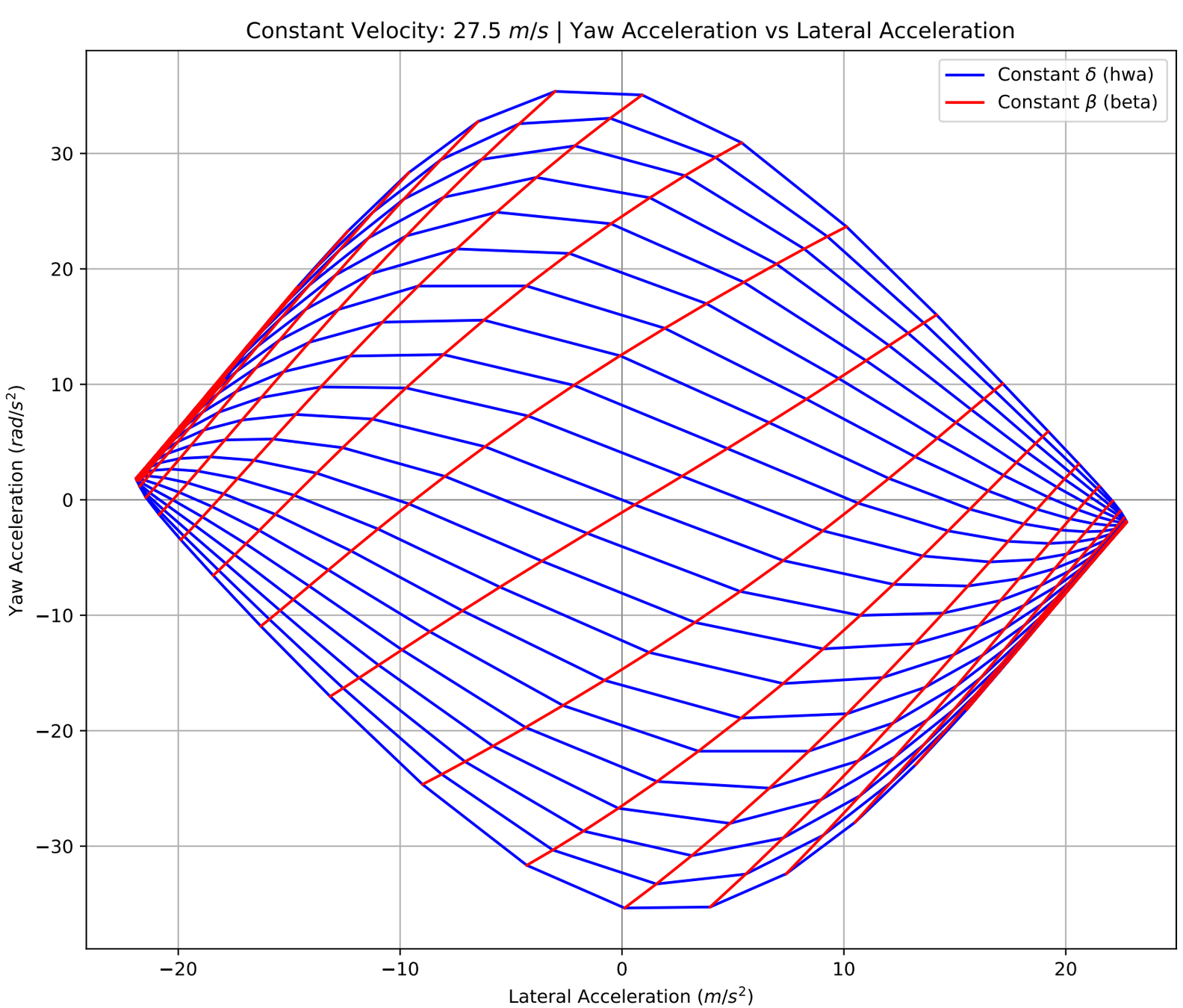
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.665	22.494
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.112	21.768
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.812	-1.907
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.078	35.111
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.867	-2.936
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.003	0.026
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.030	-0.020
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.778
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		6.078



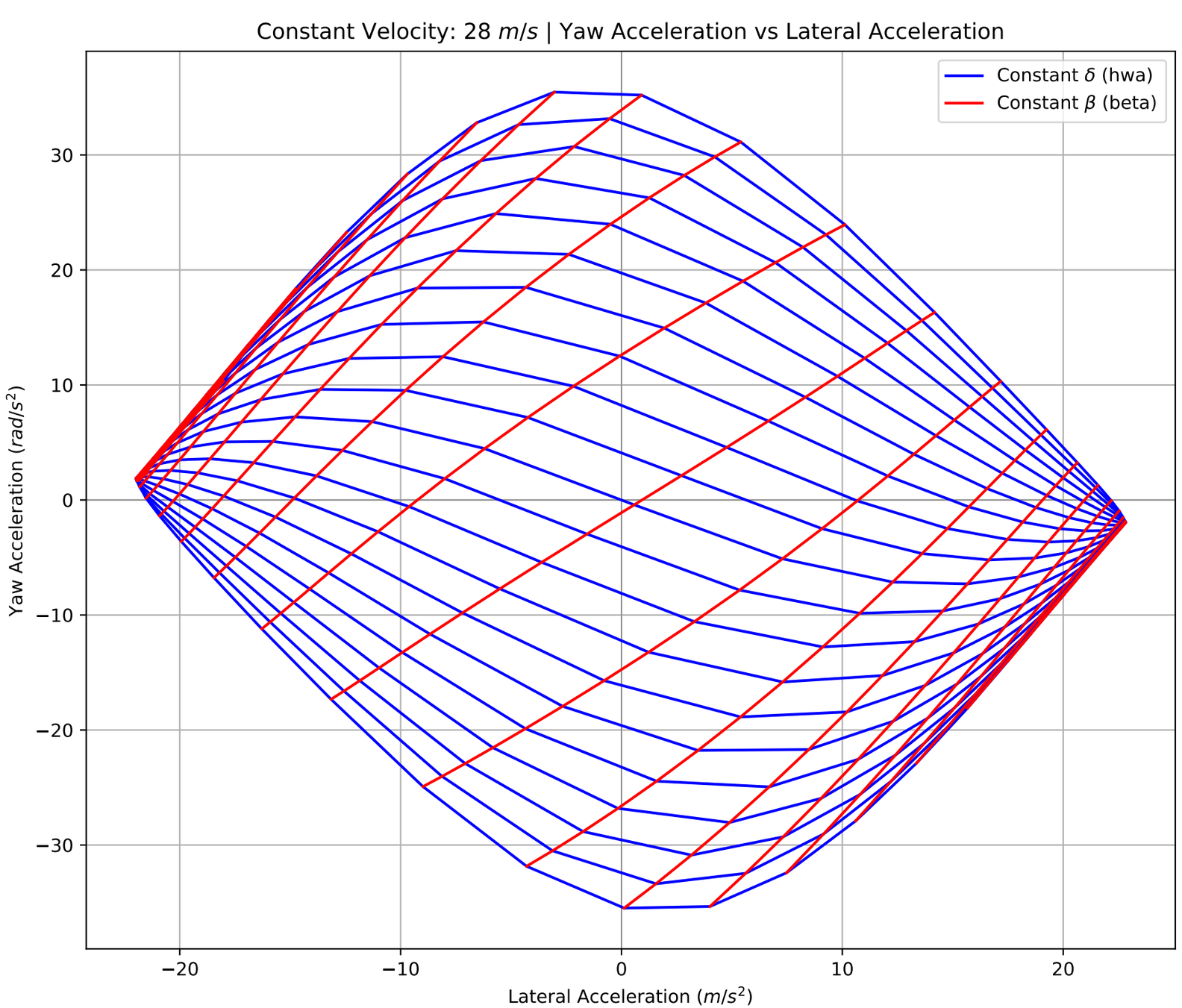
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.746	22.578
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.200	21.864
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.822	-1.919
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.139	35.195
$\beta\|_{max(\ddot{\psi})}$	(deg)	-4.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	3.902	-2.962
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.003	0.022
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.045	-0.009
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		3.899
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		5.886



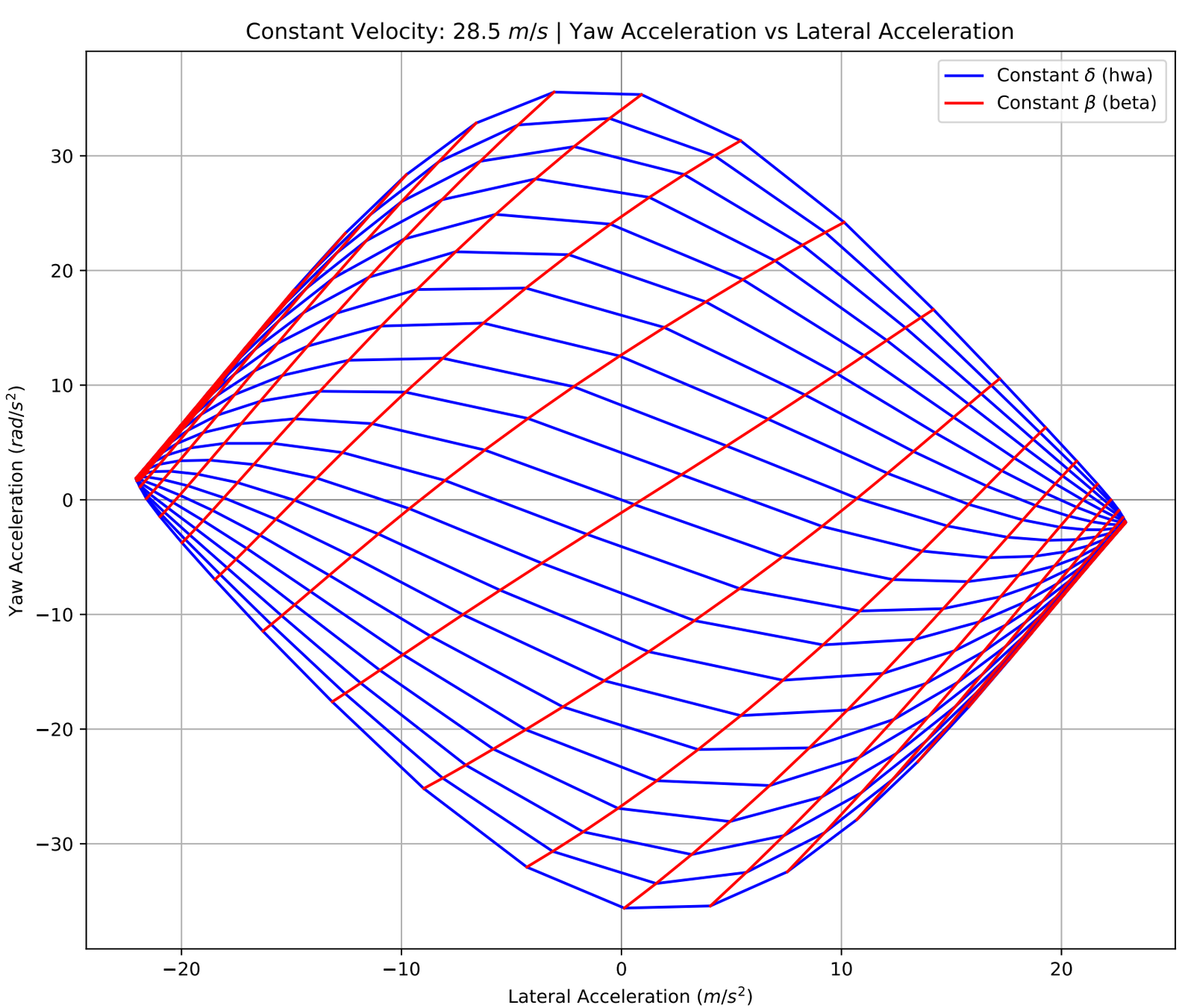
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.827	22.663
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.288	21.960
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.833	-1.930
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.238	35.282
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.110	-2.988
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.007	0.019
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.060	0.001
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.015
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		5.704



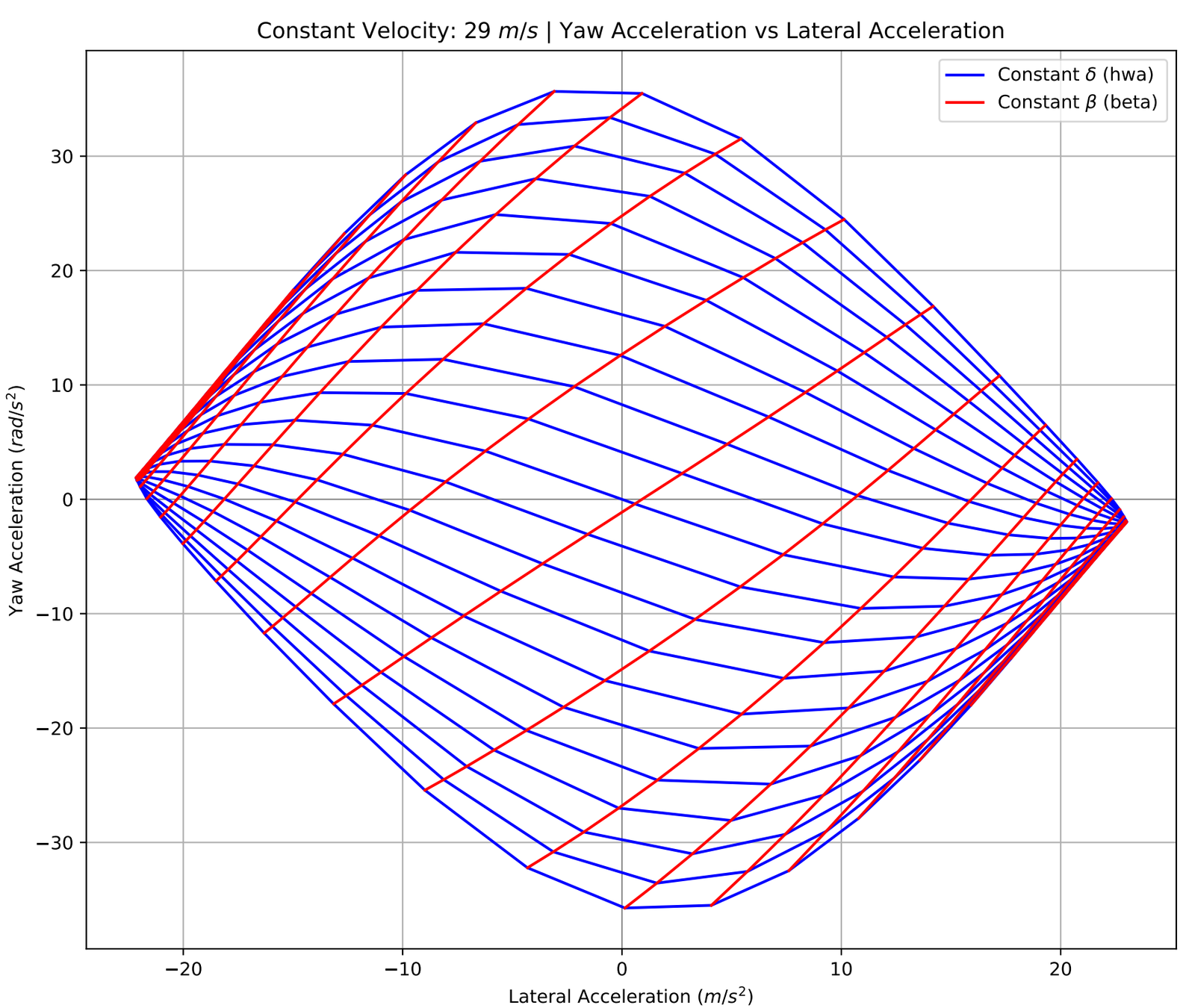
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.909	22.749
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.377	22.055
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.843	-1.942
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.359	35.372
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.115	-3.013
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.012	0.016
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.075	0.012
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.126
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		5.532



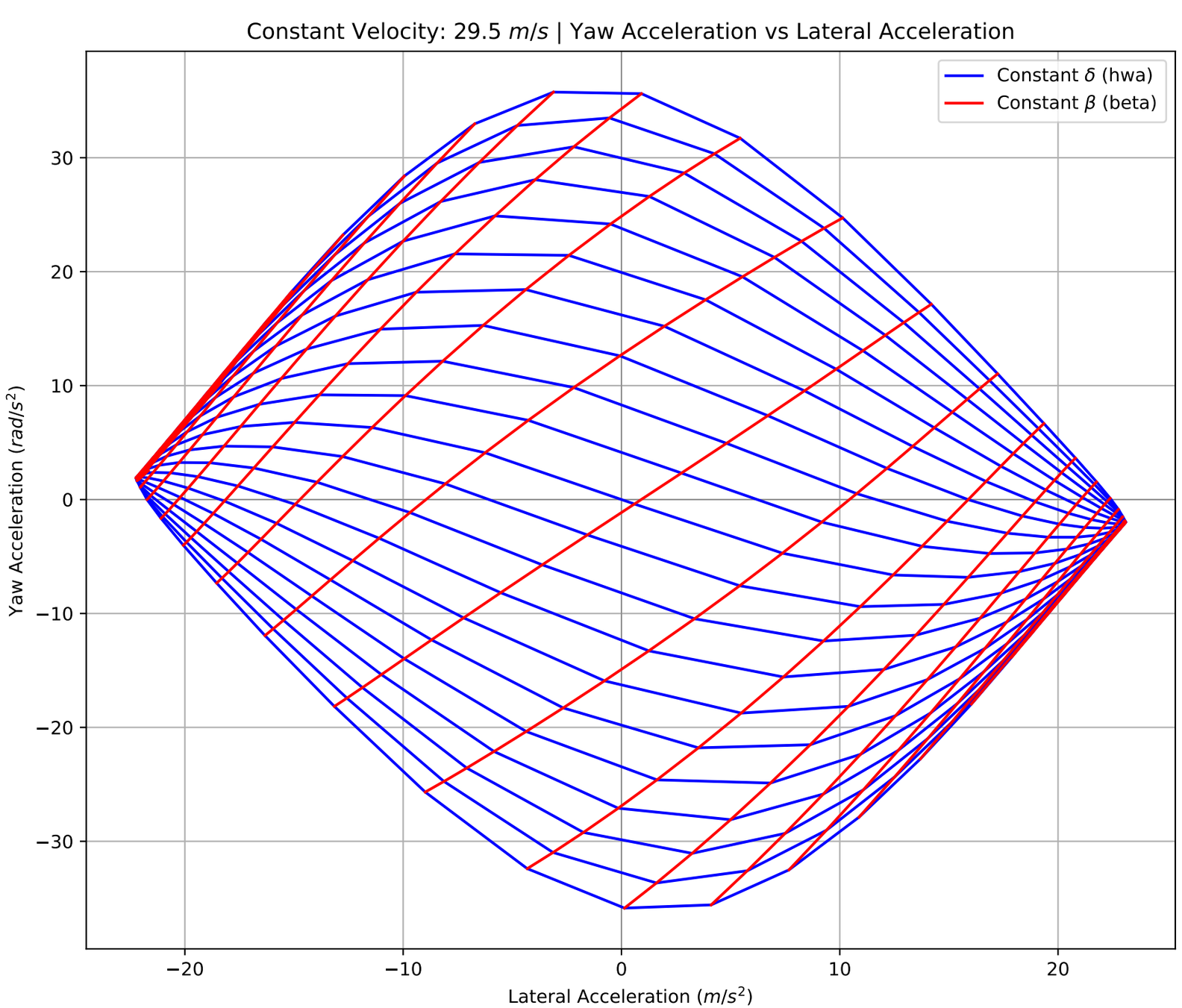
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-21.992	22.836
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.466	22.151
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.852	-1.954
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.483	35.466
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.121	-3.039
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.016	0.013
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.089	0.022
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.233
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		5.368



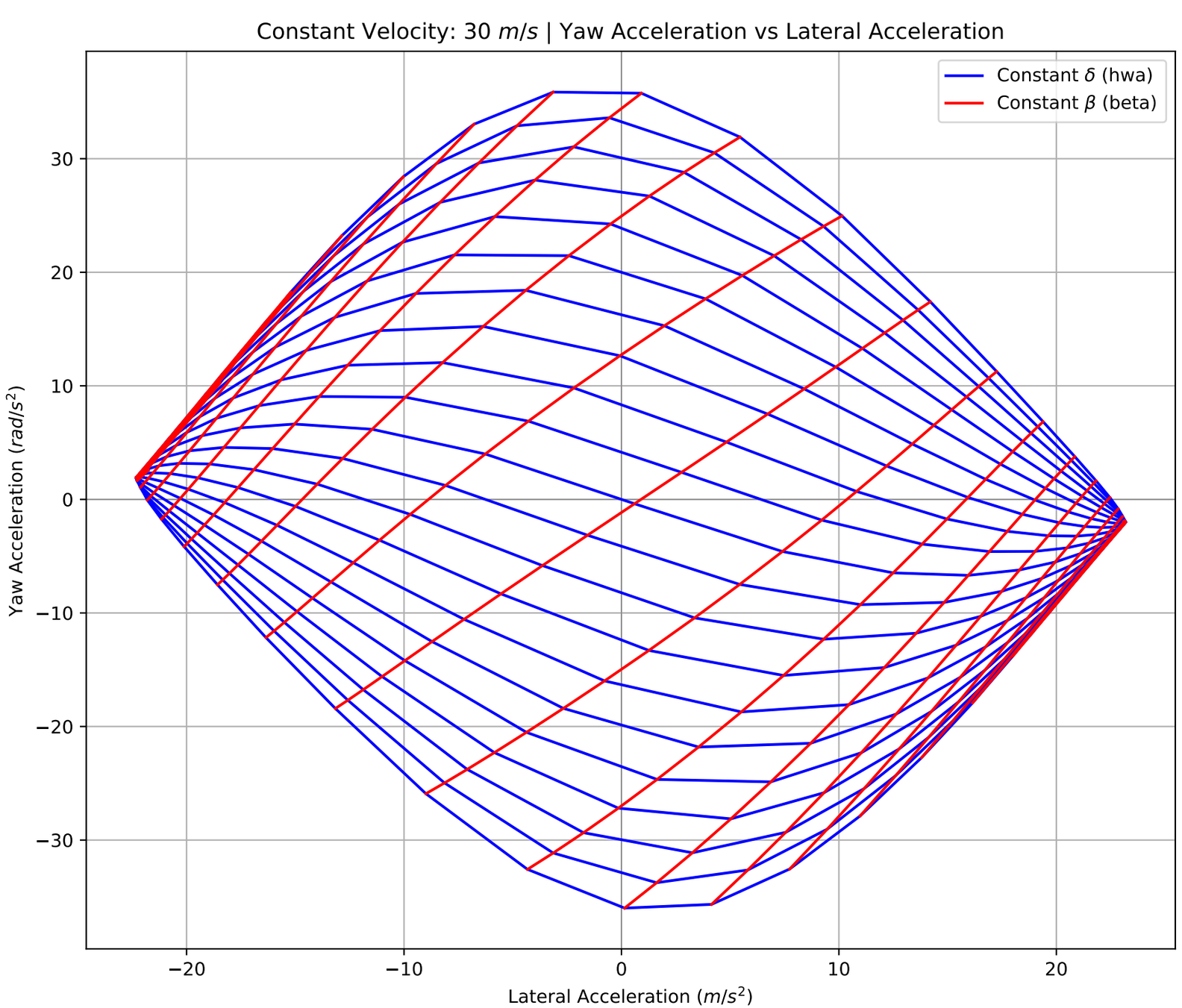
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-22.076	22.924
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.555	22.246
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.862	-1.966
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.607	35.562
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.127	-3.064
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.019	0.011
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.103	0.032
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.335
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		5.213



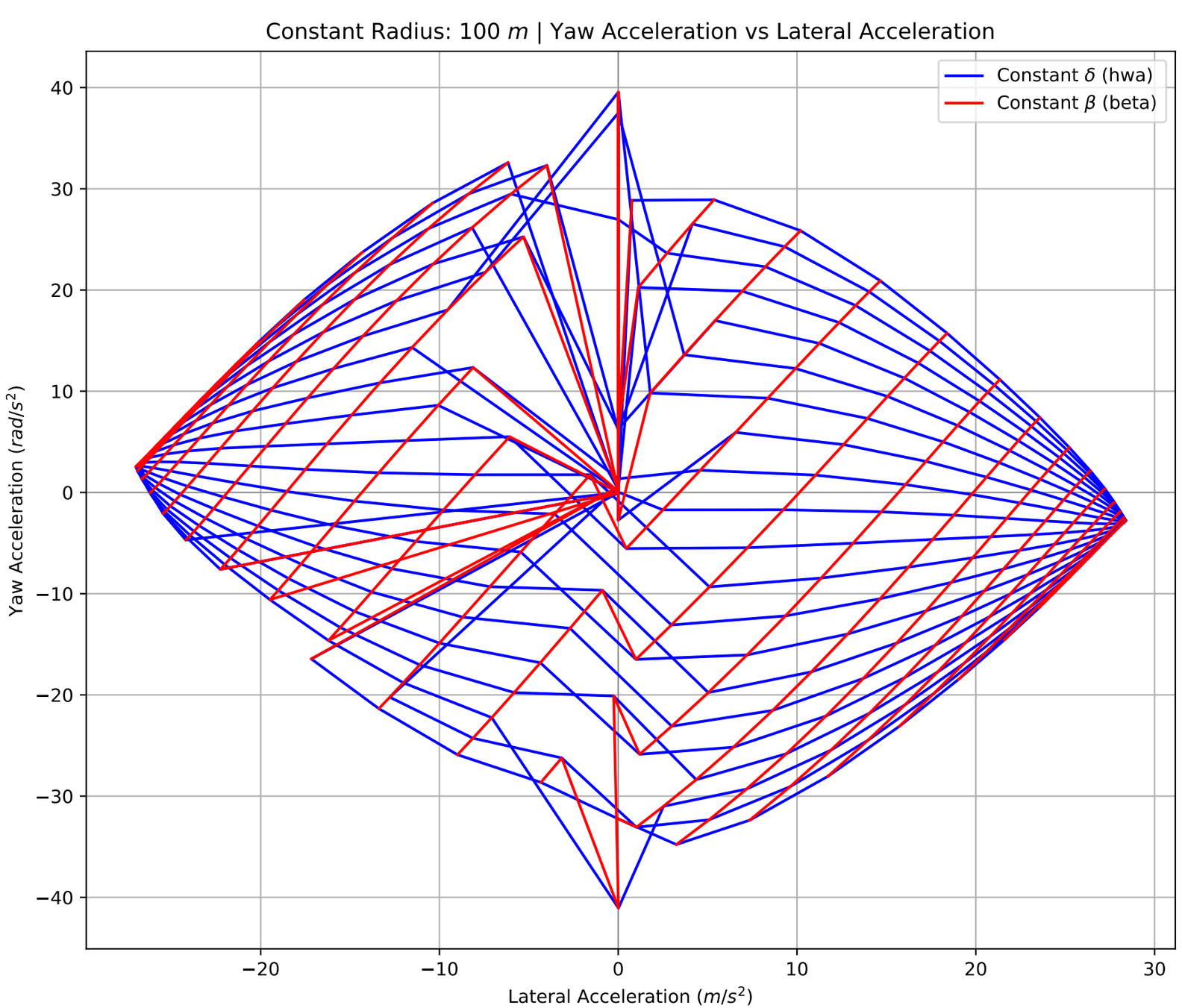
		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-22.162	23.013
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.645	22.339
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.872	-1.977
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.733	35.661
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.133	-3.089
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.023	0.009
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.116	0.041
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.434
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		5.065



		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-22.248	23.104
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.736	22.432
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.881	-1.989
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.861	35.763
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.139	-3.114
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.026	0.007
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.129	0.051
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.529
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.924



		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-22.335	23.195
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-21.822	22.525
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	1.891	-2.001
$\beta\|_{max(a_y)}$	(deg)	8.000	-9.000
$\delta\|_{max(a_y)}$	(deg)	-15.000	15.000
$\max(\ddot{\psi})$	(rad/s^2)	-35.989	35.867
$\beta\|_{max(\ddot{\psi})}$	(deg)	-3.000	4.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-25.000	25.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.145	-3.140
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.029	0.005
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.142	0.060
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.620
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		4.790



		Left Half	Right Half
$\max(a_y)$	(m/s^2)	-26.986	28.391
$\max(a_{y\|\ddot{\psi}=0})$	(m/s^2)	-26.211	27.370
$\ddot{\psi}\|_{max(a_y)}$	(rad/s^2)	2.535	-2.762
$\beta\|_{max(a_y)}$	(deg)	9.000	-10.000
$\delta\|_{max(a_y)}$	(deg)	-10.000	10.000
$\max(\ddot{\psi})$	(rad/s^2)	-41.060	39.554
$\beta\|_{max(\ddot{\psi})}$	(deg)	-2.000	2.000
$\delta\|_{max(\ddot{\psi})}$	(deg)	-20.000	10.000
$a_y\|_{max(\ddot{\psi})}$	(m/s^2)	0.013	0.007
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	-0.007	0.030
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{max(a_y)}$	$\left(\frac{rad/s^2}{deg}\right)$	0.243	0.178
$\frac{d\ddot{\psi}}{d\delta}\Big\|_{\beta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		-5.387
$\frac{d\ddot{\psi}}{d\beta}\Big\|_{\delta=0}$	$\left(\frac{rad/s^2}{deg}\right)$		7.068

First Principles Tire Metrics

Simulation Author: Robert Horvath

Generated By: Robert (roberthorvath5@gmail.com)

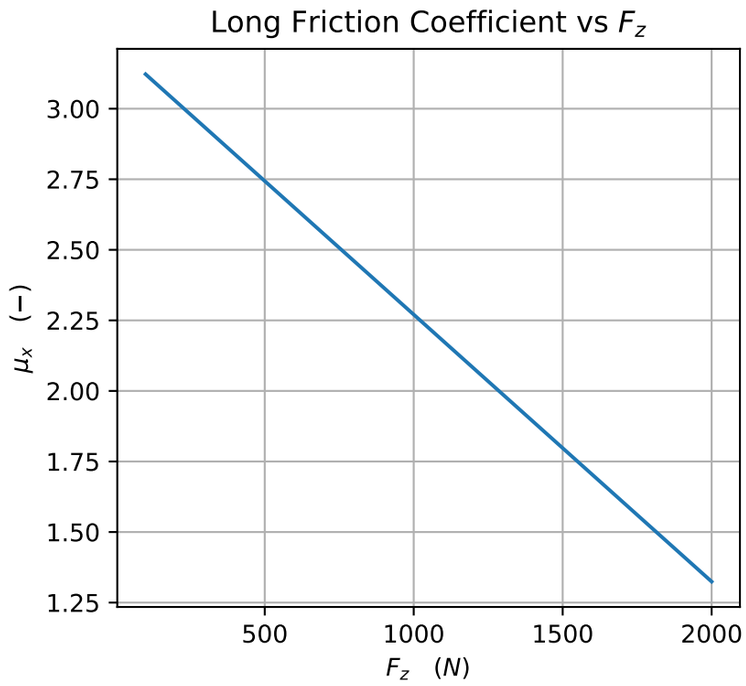
Date: 2025-06-19, 04:04 AM PDT

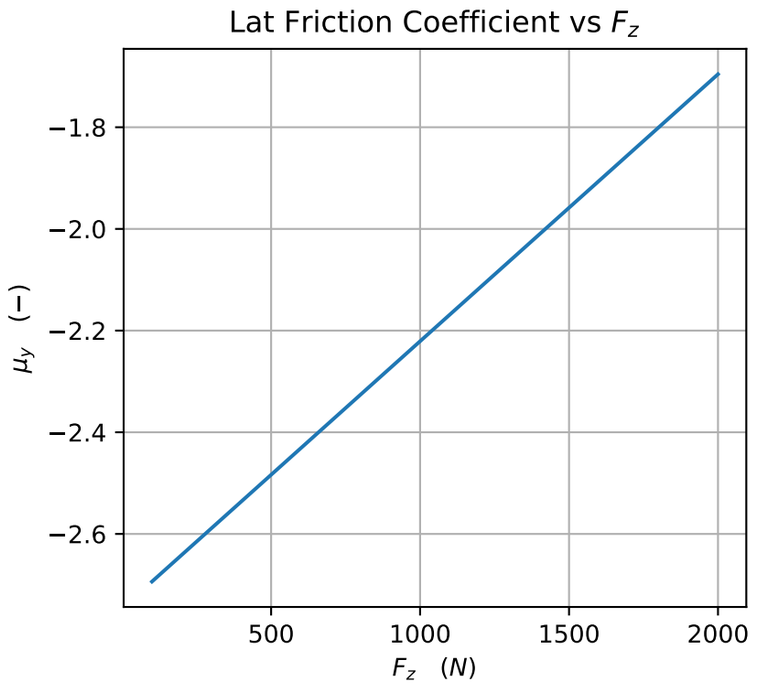
Note 1: This report applies for: Hoosier_R20_16x7p5_10_on_7in

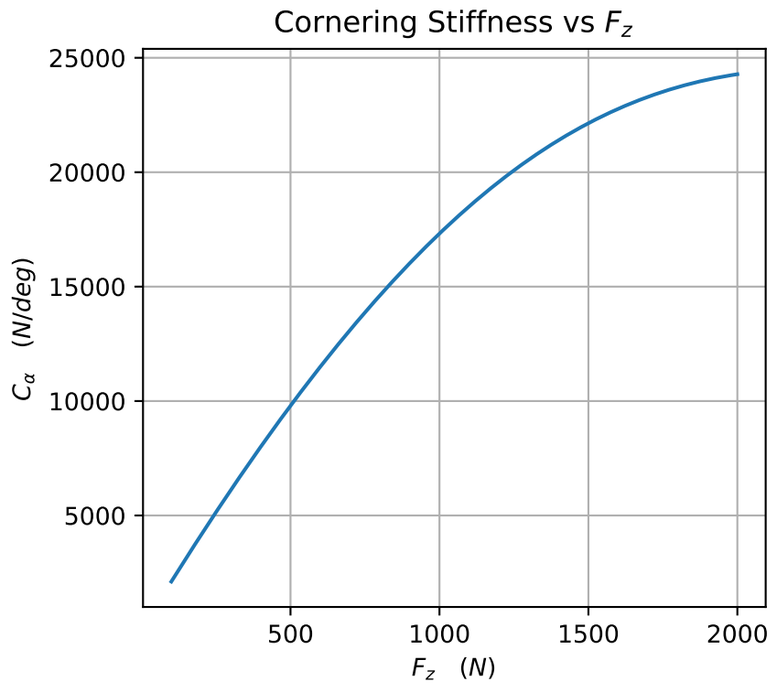
Note 2: Relaxation length vs F_z uses a smaller F_z range than other plots to avoid extrapolation

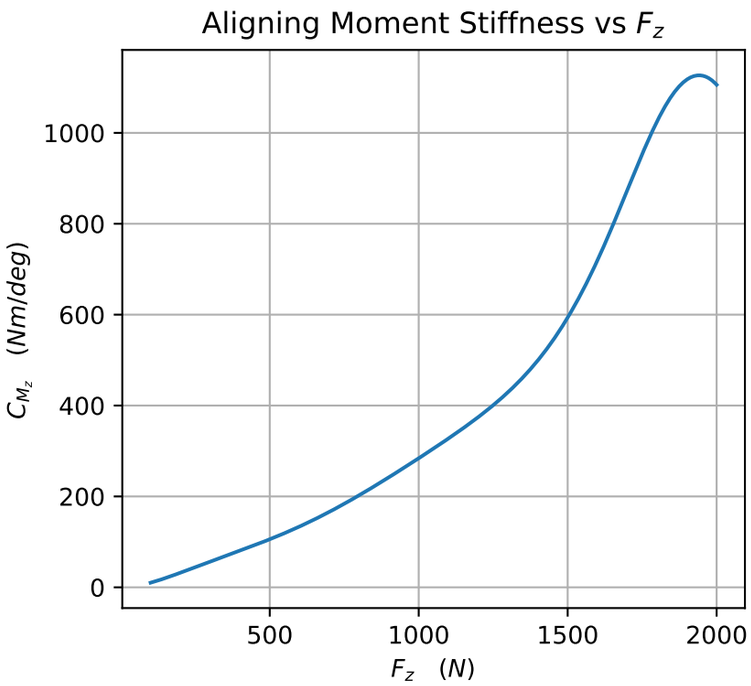
Note 3: Vertical stiffness: 98947 (N/m)

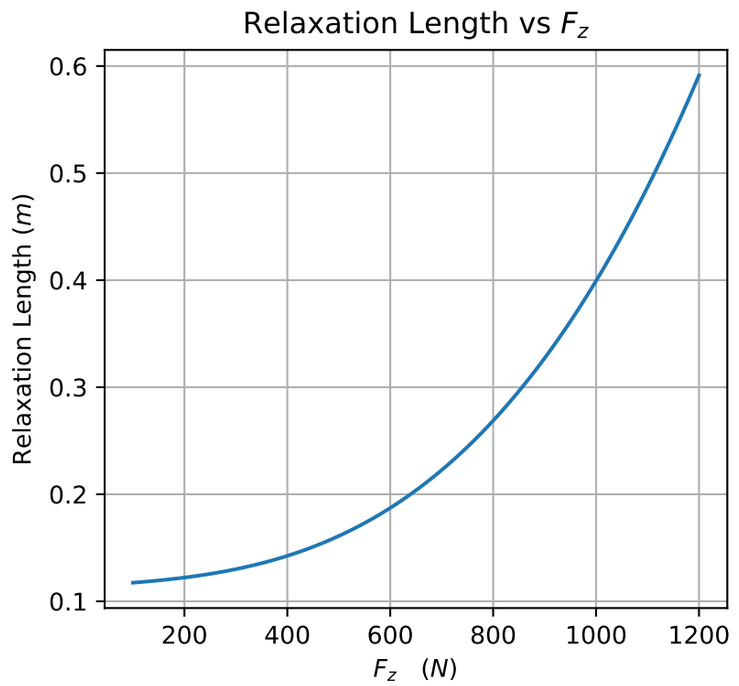
Note 4: Vertical damping: 115.844 (Ns/m)

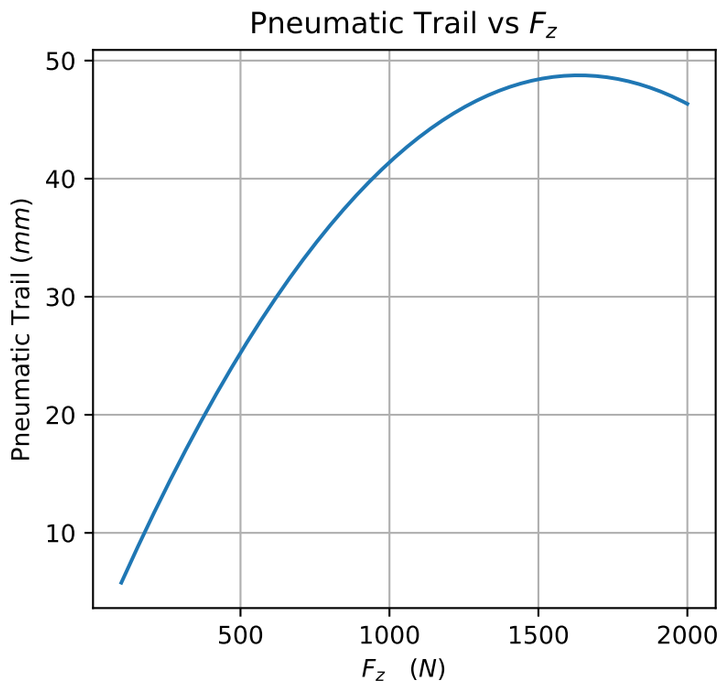

Long Friction Coefficient vs F_z
μ_x (−)
F_z (N)
3.00
2.75
2.50
2.25
2.00
1.75
1.50
1.25
500
1000
1500
2000

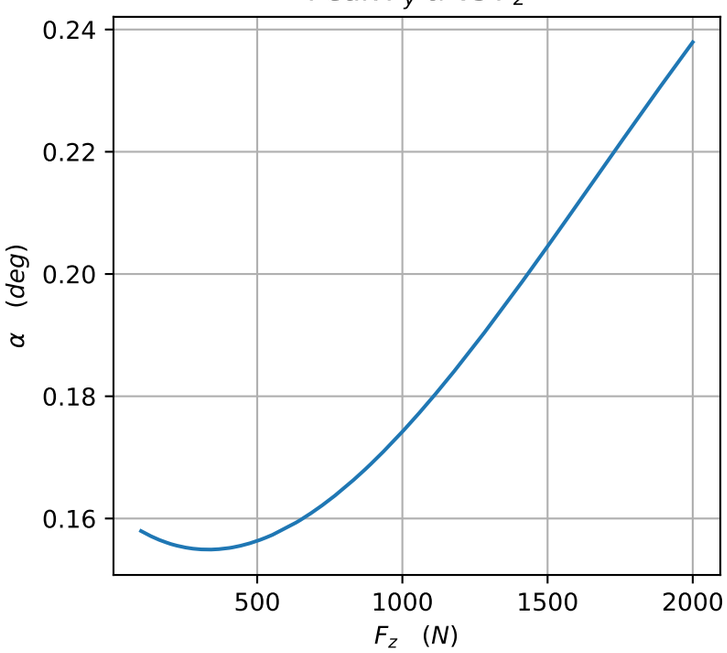

Lat Friction Coefficient vs F_z
μ_y (−)
F_z (N)
−1.8
−2.0
−2.2
−2.4
−2.6
500
1000
1500
2000

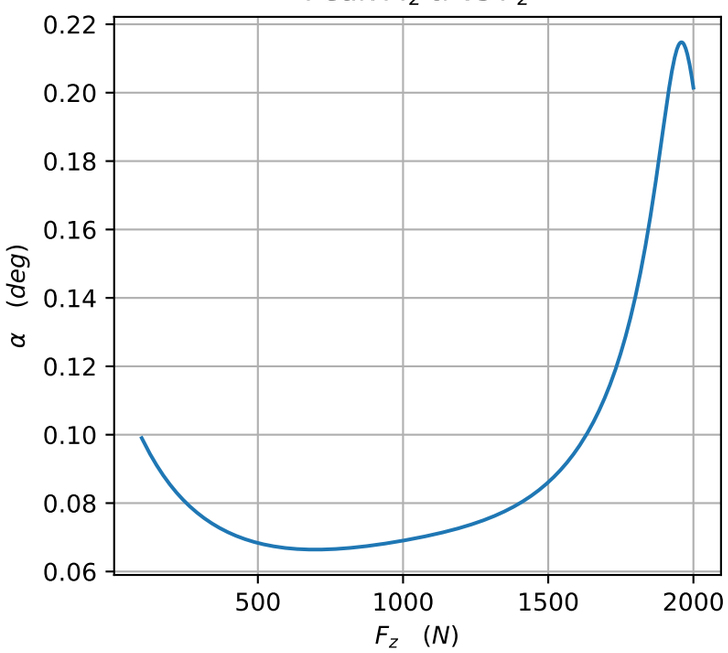

Cornering Stiffness vs F_z
C_α (N/deg)
F_z (N)
25000
20000
15000
10000
5000
500
1000
1500
2000

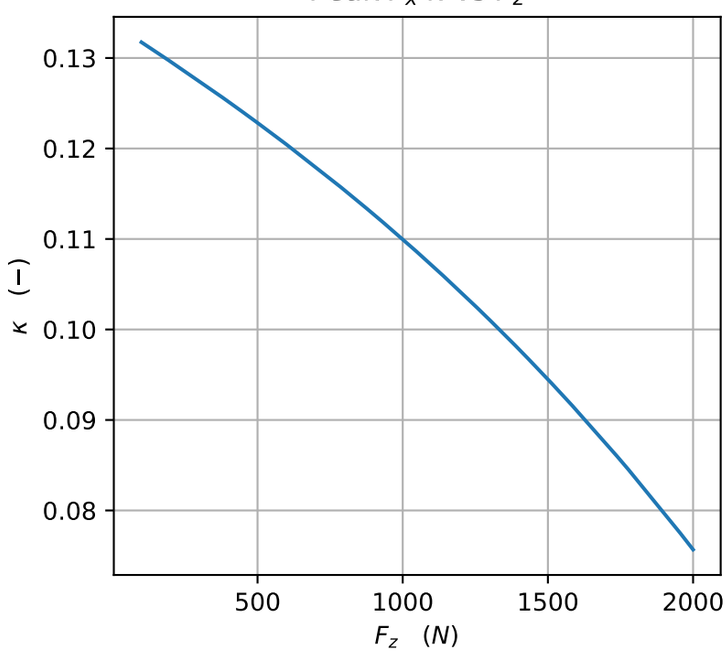

Aligning Moment Stiffness vs F_z
C_{M_z} (Nm/deg)
F_z (N)
1000
800
600
400
200
0
500
1000
1500
2000

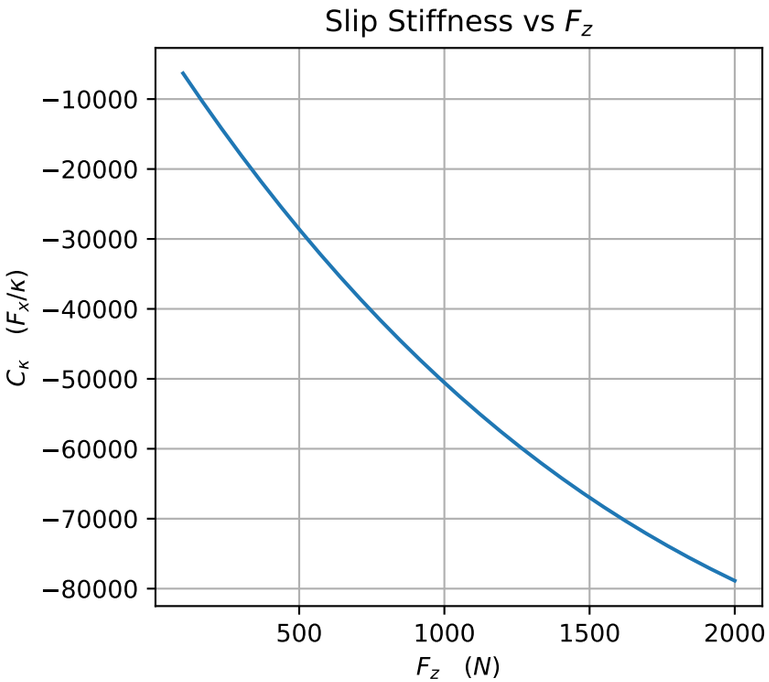

Relaxation Length vs F_z
Relaxation Length (m)
F_z (N)
0.6
0.5
0.4
0.3
0.2
0.1
200
400
600
800
1000
1200

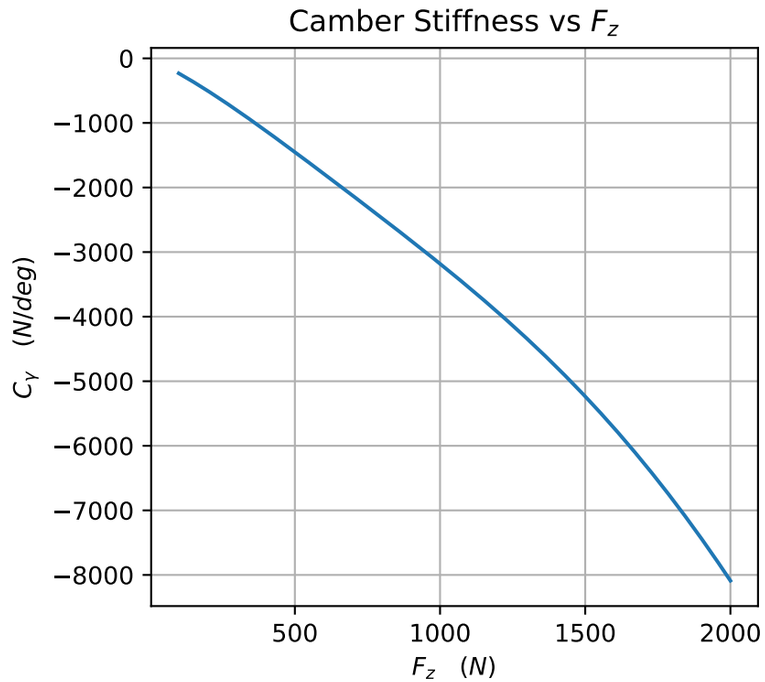

Pneumatic Trail vs F_z
Pneumatic Trail (mm)
F_z (N)
50
40
30
20
10
500
1000
1500
2000

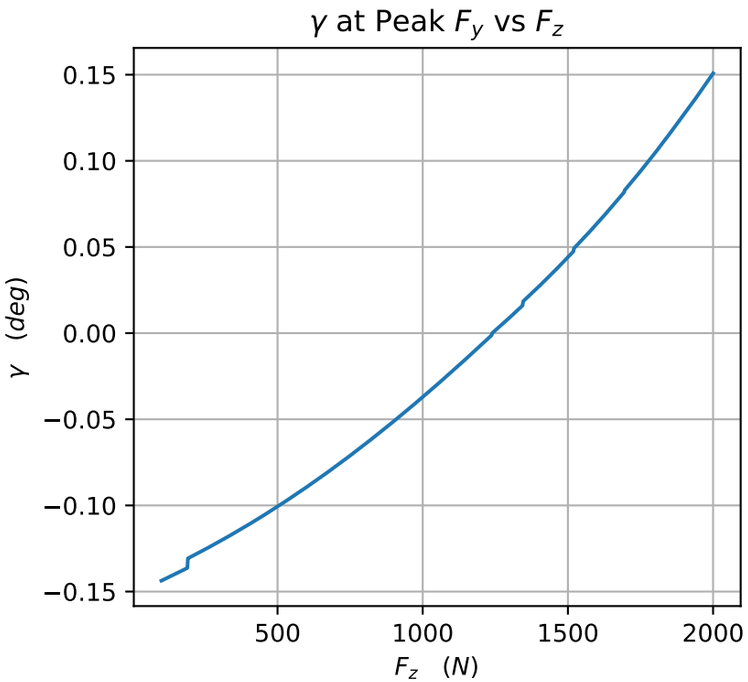

Peak F_y α vs F_z
0.24
0.22
0.20
0.18
0.16
α (deg)
500
1000
1500
2000
F_z (N)


Peak M_z α vs F_z
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
α (deg)
500
1000
1500
2000
F_z (N)


Peak F_x κ vs F_z
0.13
0.12
0.11
0.10
0.09
0.08
κ (−)
500
1000
1500
2000
F_z (N)


Slip Stiffness vs F_z
−10000
−20000
−30000
−40000
−50000
−60000
−70000
−80000
C_κ (F_x/κ)
500
1000
1500
2000
F_z (N)


Camber Stiffness vs F_z
0
−1000
−2000
−3000
−4000
−5000
−6000
−7000
−8000
C_γ (N/deg)
500
1000
1500
2000
F_z (N)


γ at Peak F_y vs F_z
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
γ (deg)
500
1000
1500
2000
F_z (N)

Kinematics Report

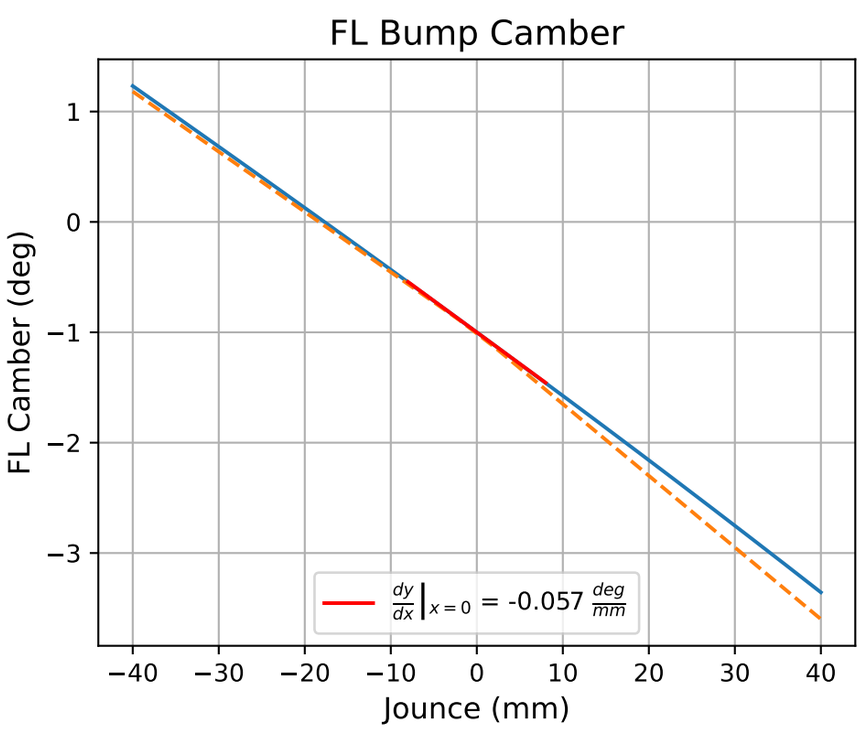
Simulation Author: Robert Horvath

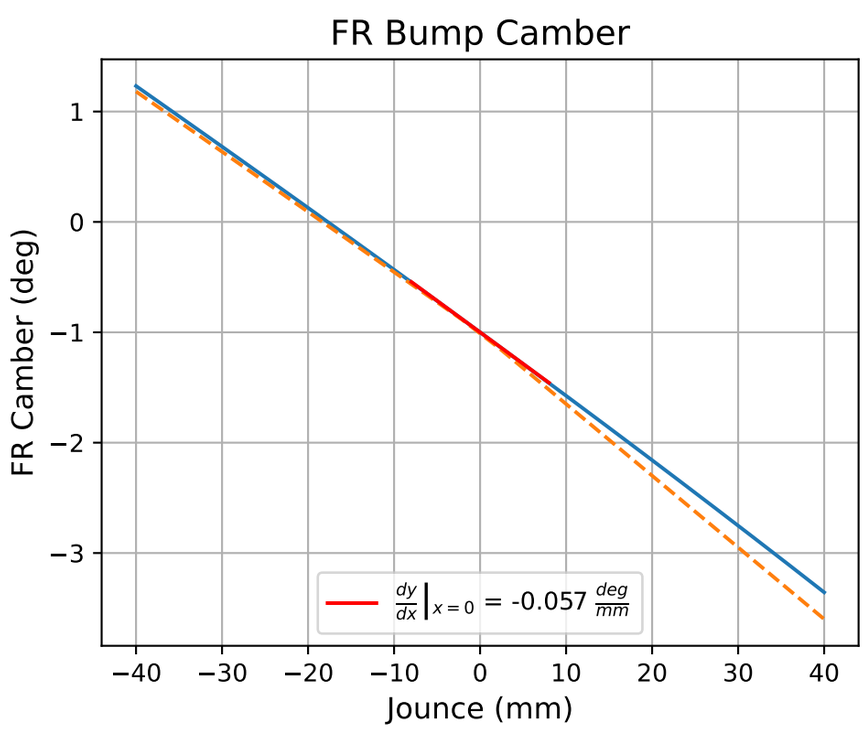
Generated By: Robert (roberthorvath5@gmail.com)

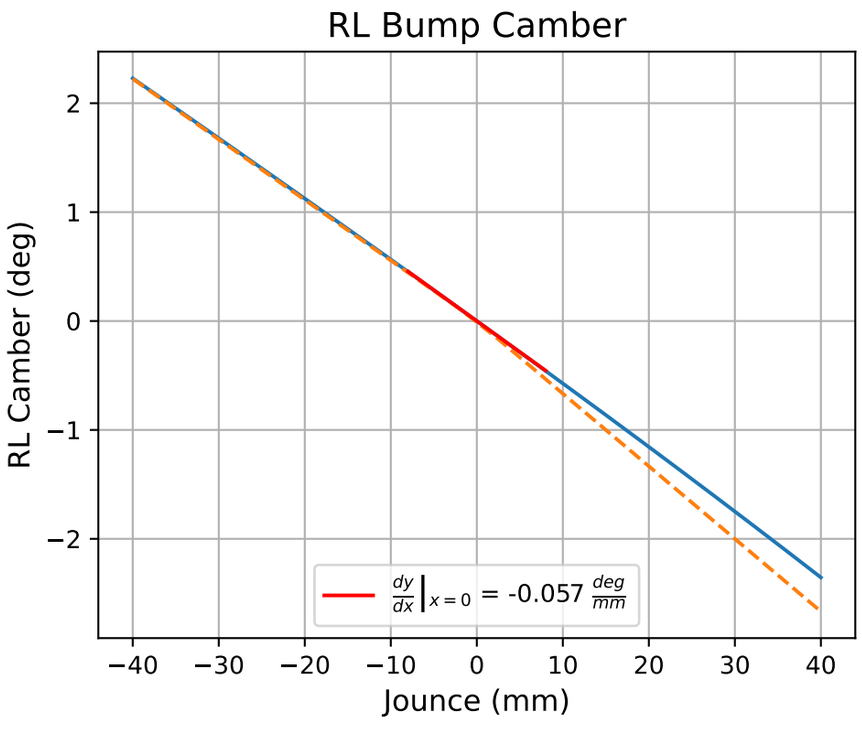
Date: 2025-07-02, 07:45 PM PDT

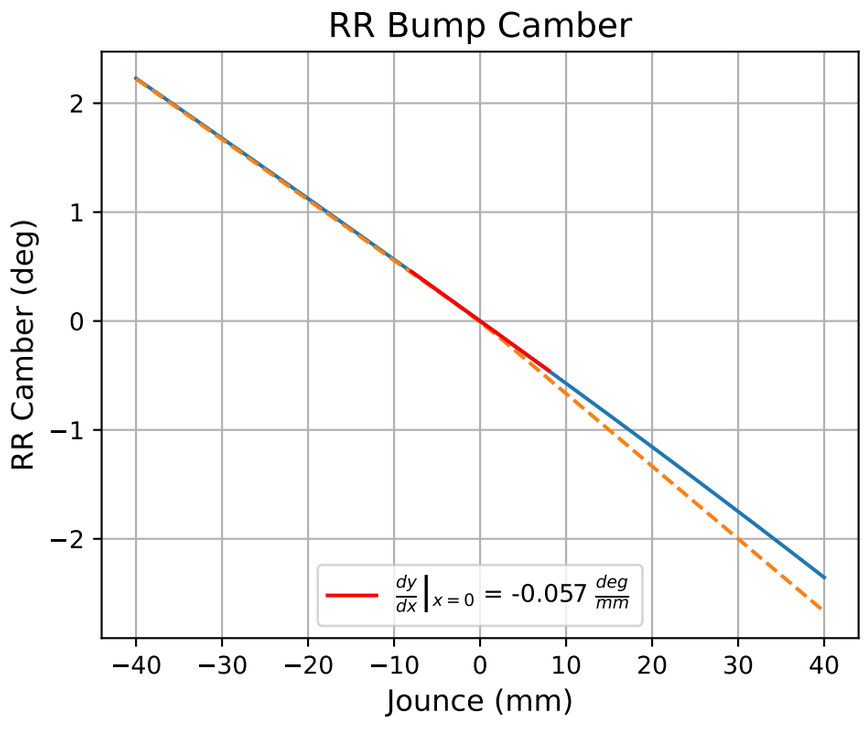
Note 1: Linear fits are tangent lines about x = 0 (NOT fits over the entire range)

Note 2: Cubic fits are performed over the entire visible domain (fits over the entire range)







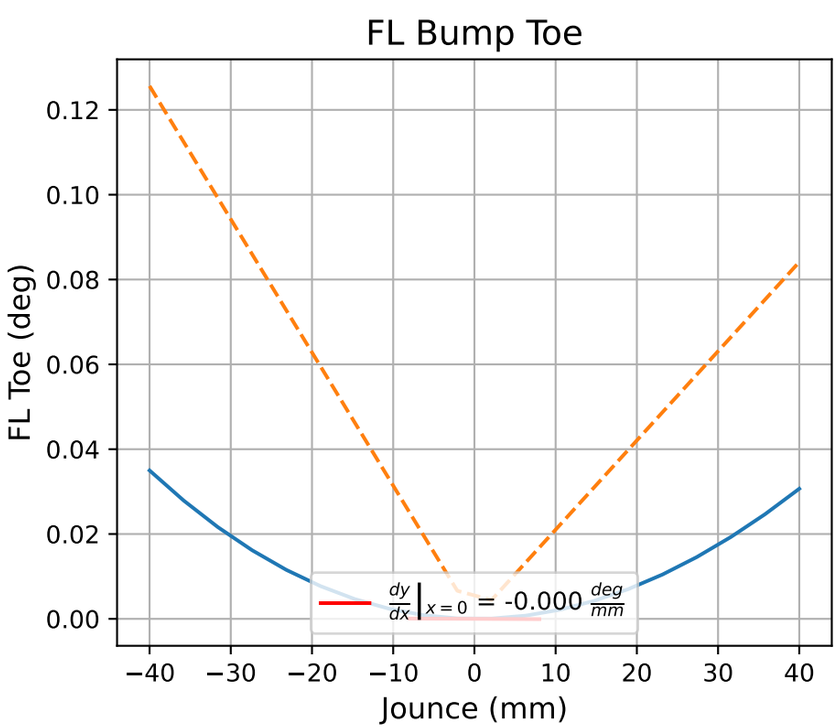


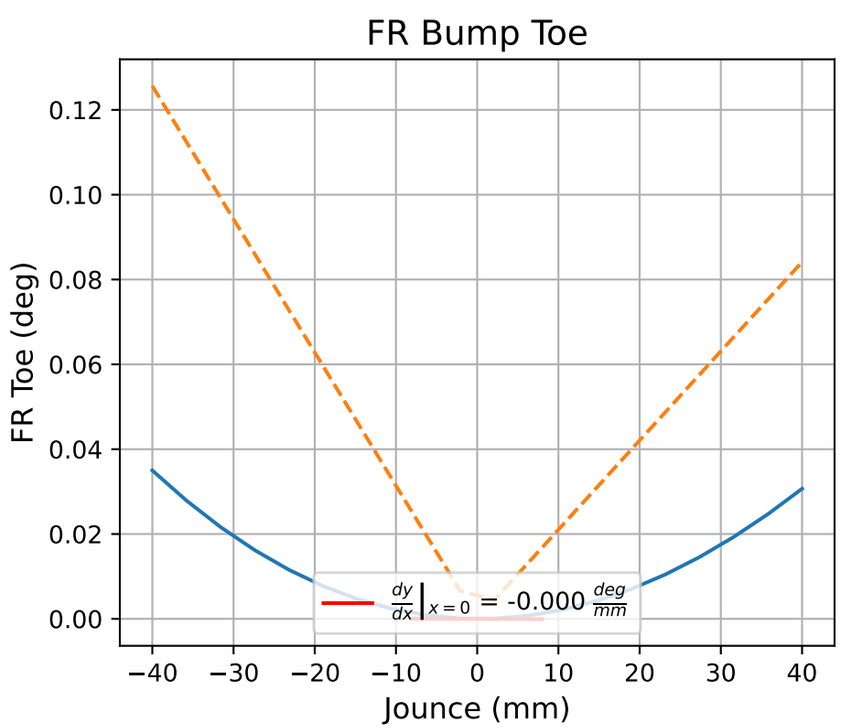
Linear Fit $f(x) = a_1x + a_0$

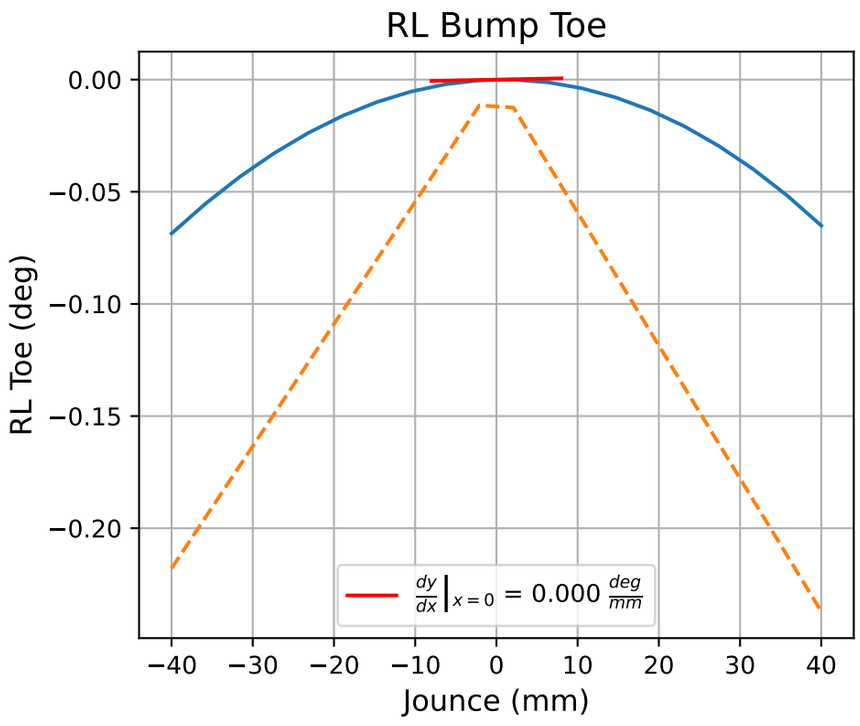
FL	$f(x) = -0.057x + -1.0$
FR	$f(x) = -0.057x + -1.0$
RL	$f(x) = -0.057x + 0.0$
RR	$f(x) = -0.057x + 0.0$

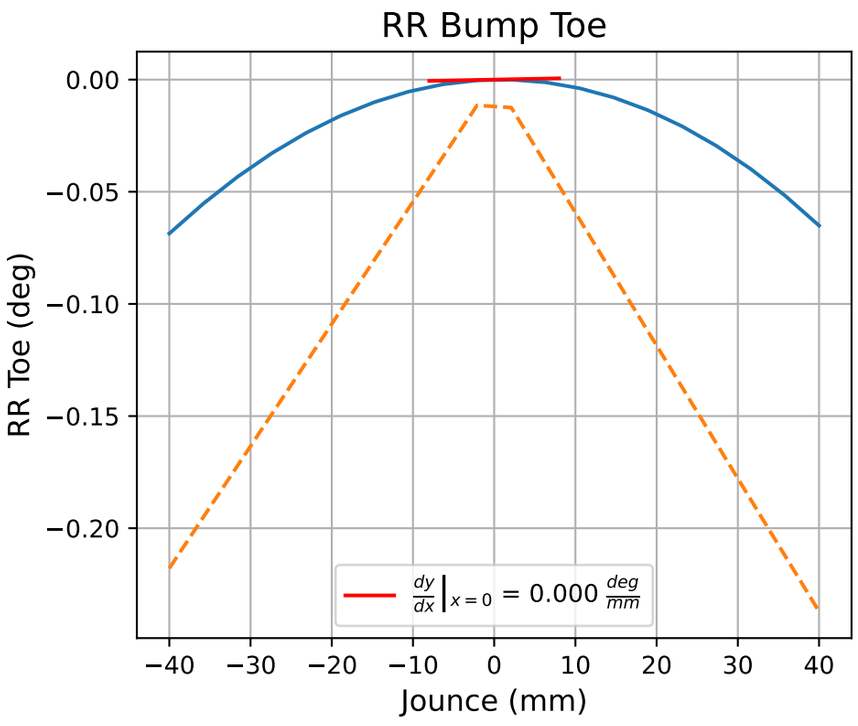
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.0x^3 + -0.0x^2 + -0.057x + -1.0$
FR	$f(x) = -0.0x^3 + -0.0x^2 + -0.057x + -1.0$
RL	$f(x) = -0.0x^3 + -0.0x^2 + -0.057x + 0.0$
RR	$f(x) = -0.0x^3 + -0.0x^2 + -0.057x + 0.0$







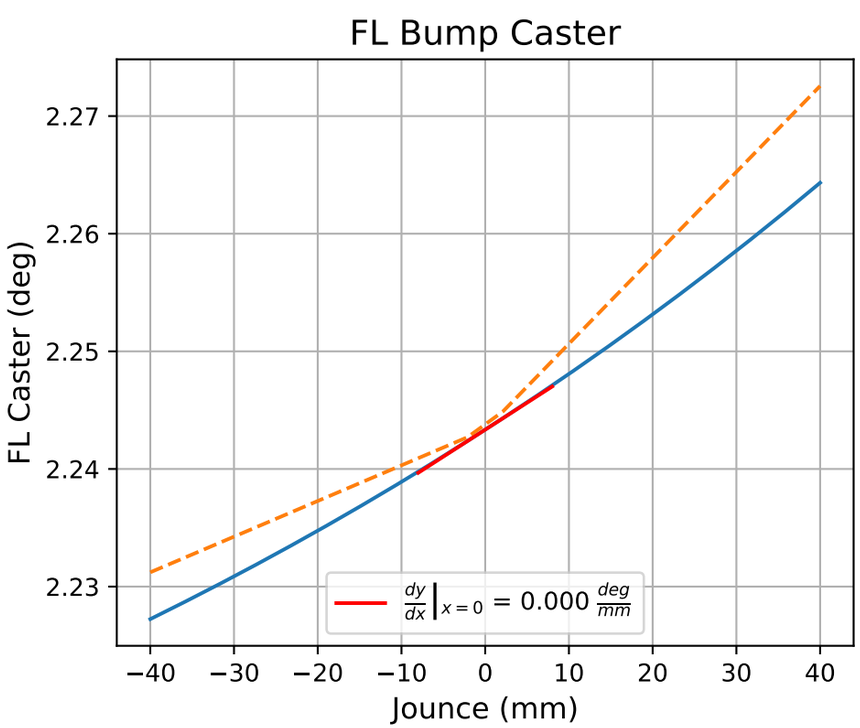


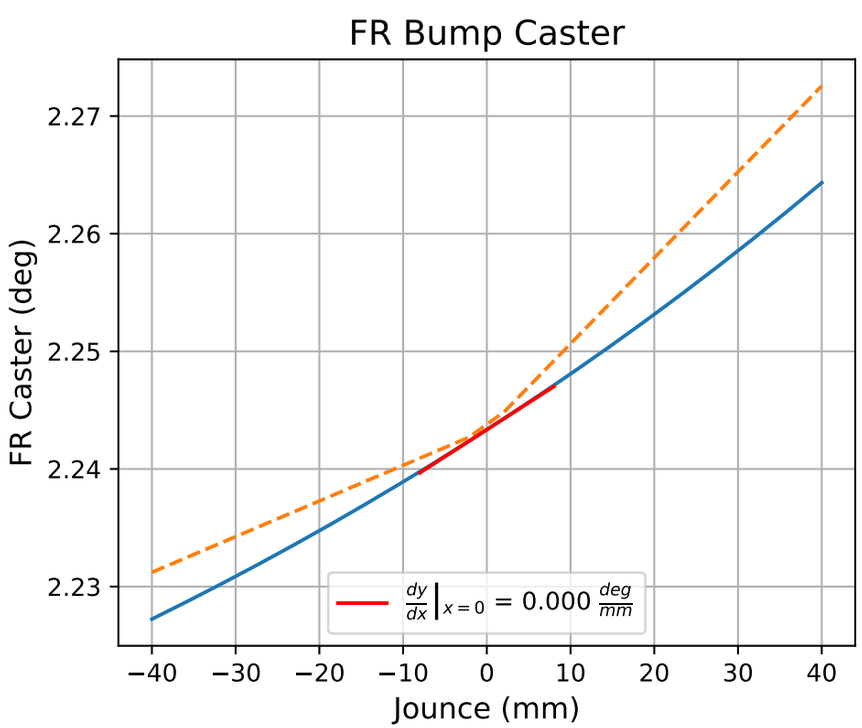
Linear Fit $f(x) = a_1x + a_0$

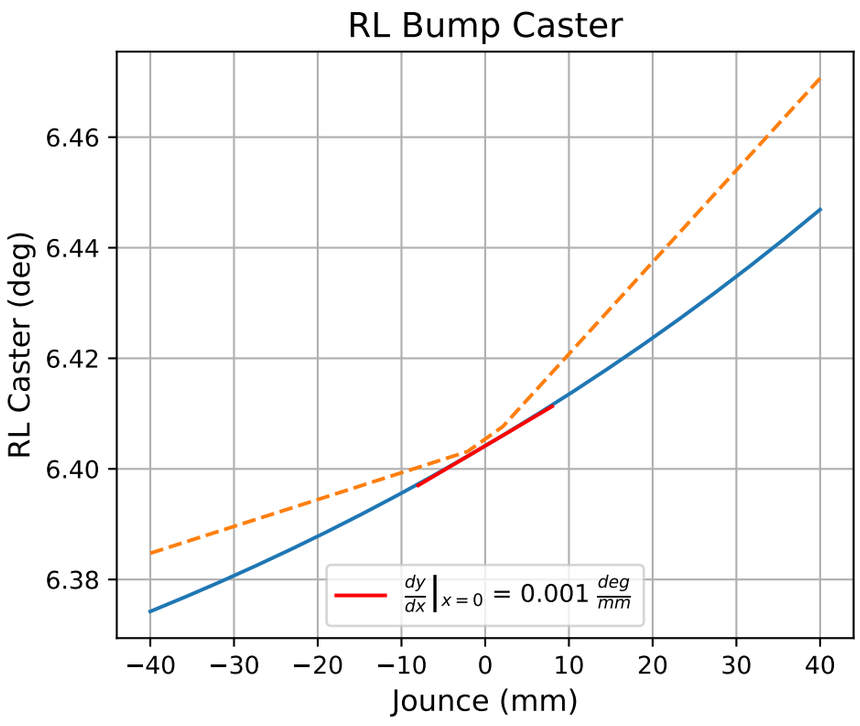
FL	$f(x) = -0.0x + -0.0$
FR	$f(x) = -0.0x + -0.0$
RL	$f(x) = 0.0x + 0.0$
RR	$f(x) = 0.0x + 0.0$

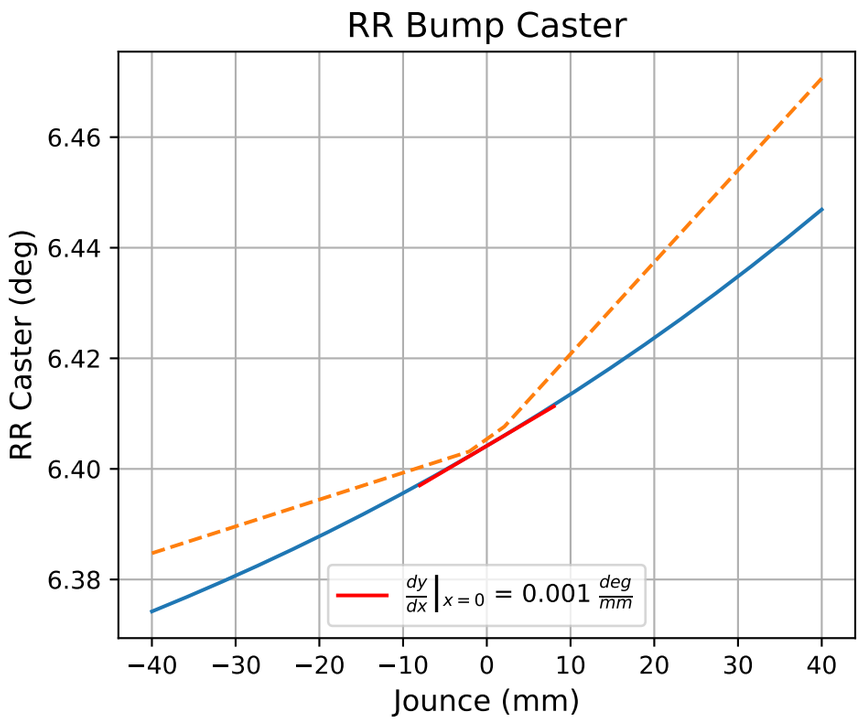
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.0x^3 + 0.0x^2 + -0.0x + -0.0$
FR	$f(x) = -0.0x^3 + 0.0x^2 + -0.0x + -0.0$
RL	$f(x) = -0.0x^3 + -0.0x^2 + 0.0x + 0.0$
RR	$f(x) = -0.0x^3 + -0.0x^2 + 0.0x + 0.0$







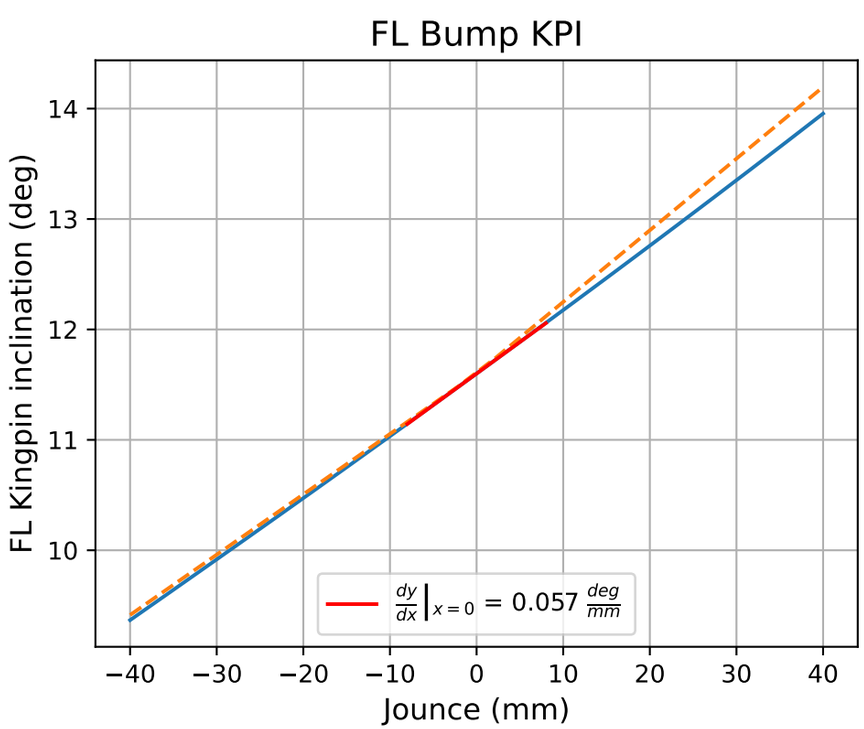


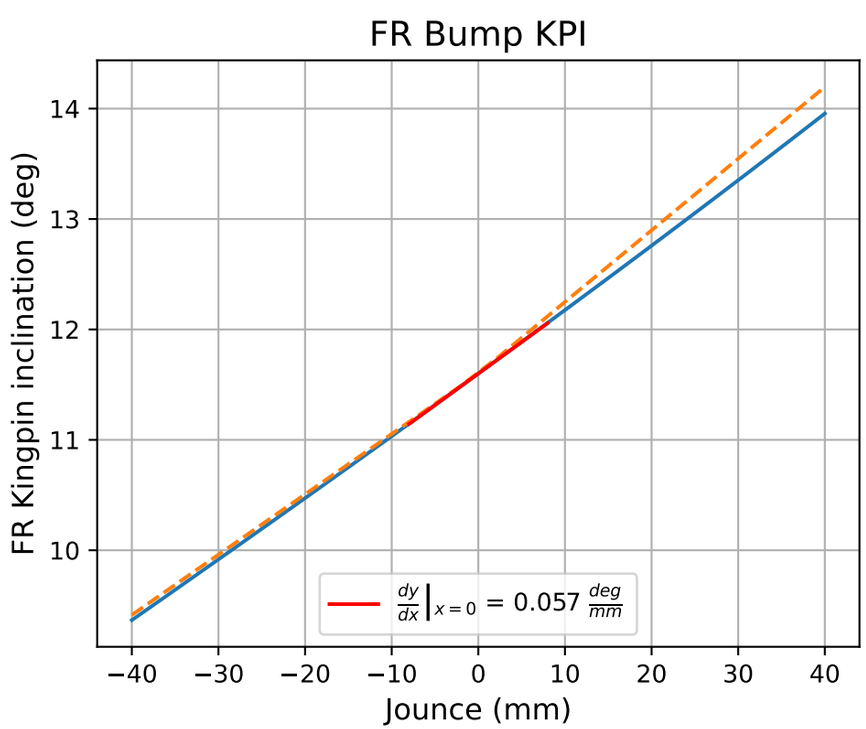
Linear Fit $f(x) = a_1x + a_0$

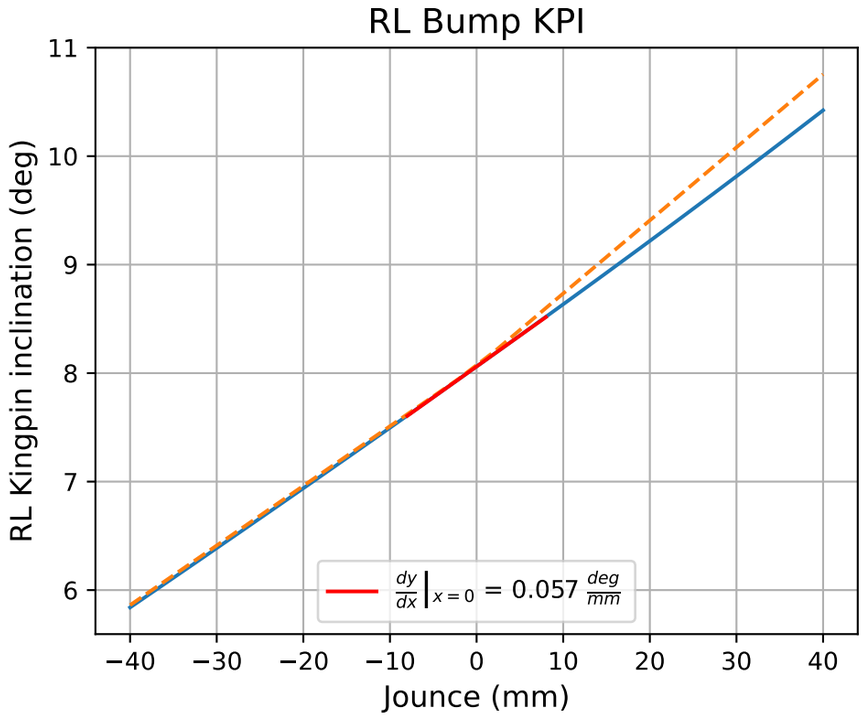
FL	$f(x) = 0.0x + 2.243$
FR	$f(x) = 0.0x + 2.243$
RL	$f(x) = 0.001x + 6.404$
RR	$f(x) = 0.001x + 6.404$

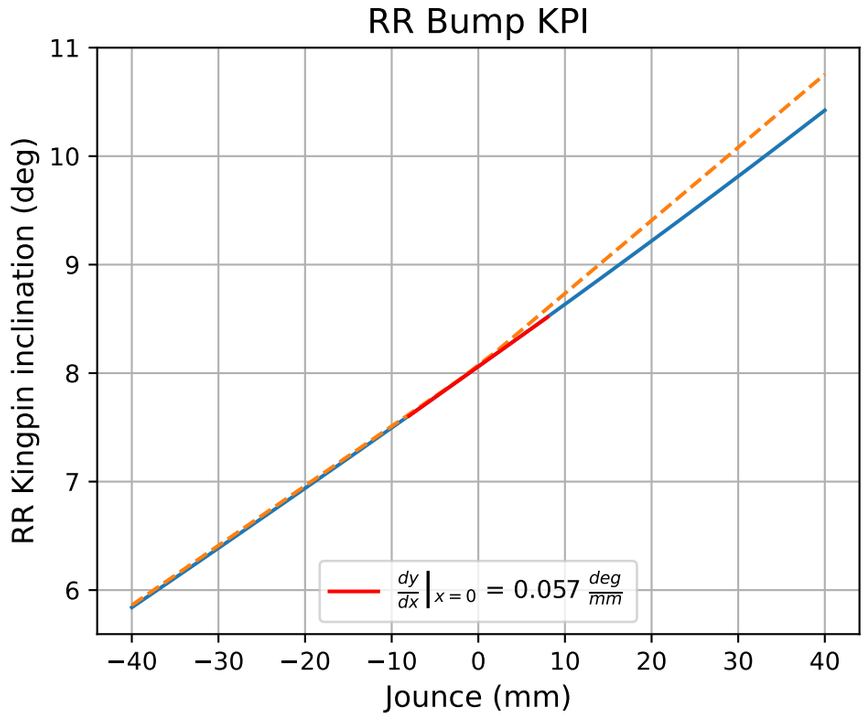
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.0x^2 + 0.0x + 2.243$
FR	$f(x) = 0.0x^3 + 0.0x^2 + 0.0x + 2.243$
RL	$f(x) = 0.0x^3 + 0.0x^2 + 0.001x + 6.404$
RR	$f(x) = 0.0x^3 + 0.0x^2 + 0.001x + 6.404$







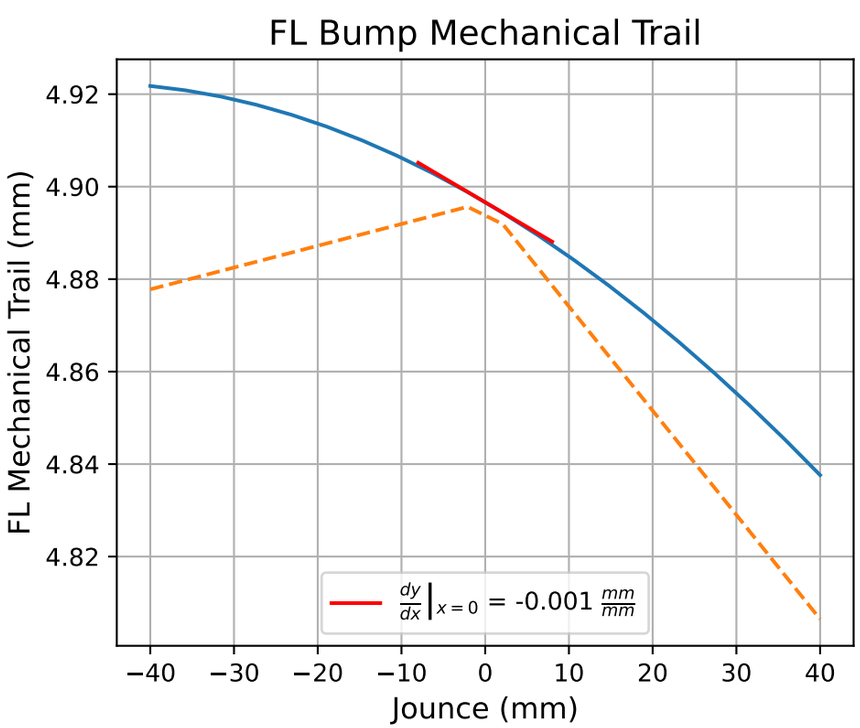


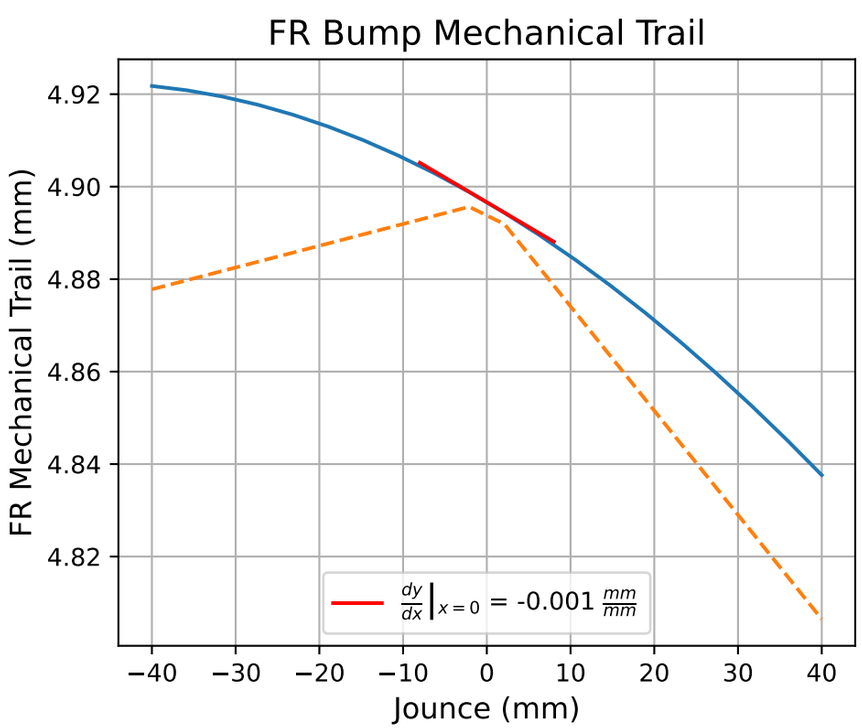
Linear Fit $f(x) = a_1x + a_0$

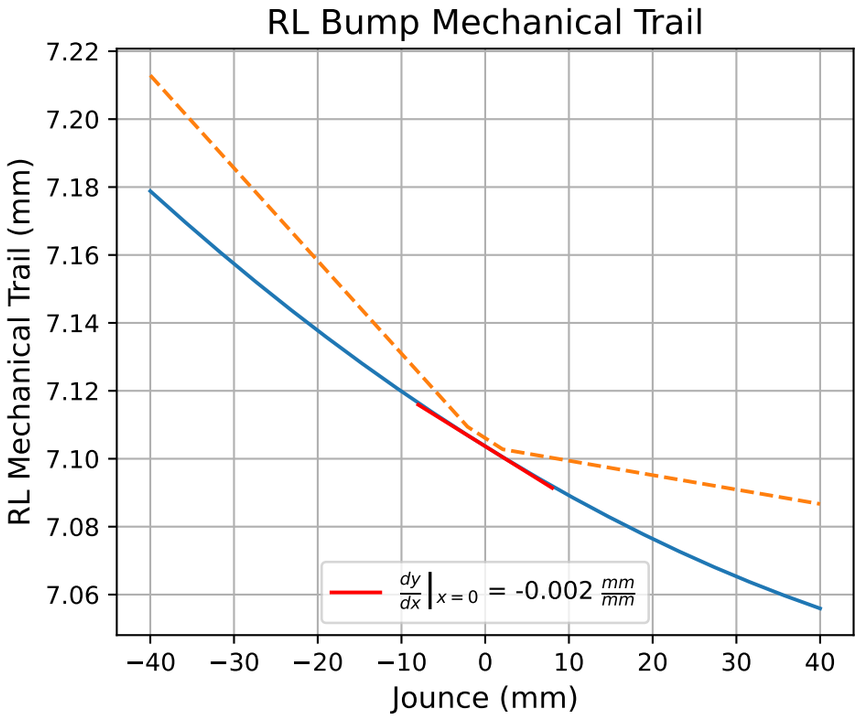
FL	$f(x) = 0.057x + 11.6$
FR	$f(x) = 0.057x + 11.6$
RL	$f(x) = 0.057x + 8.061$
RR	$f(x) = 0.057x + 8.061$

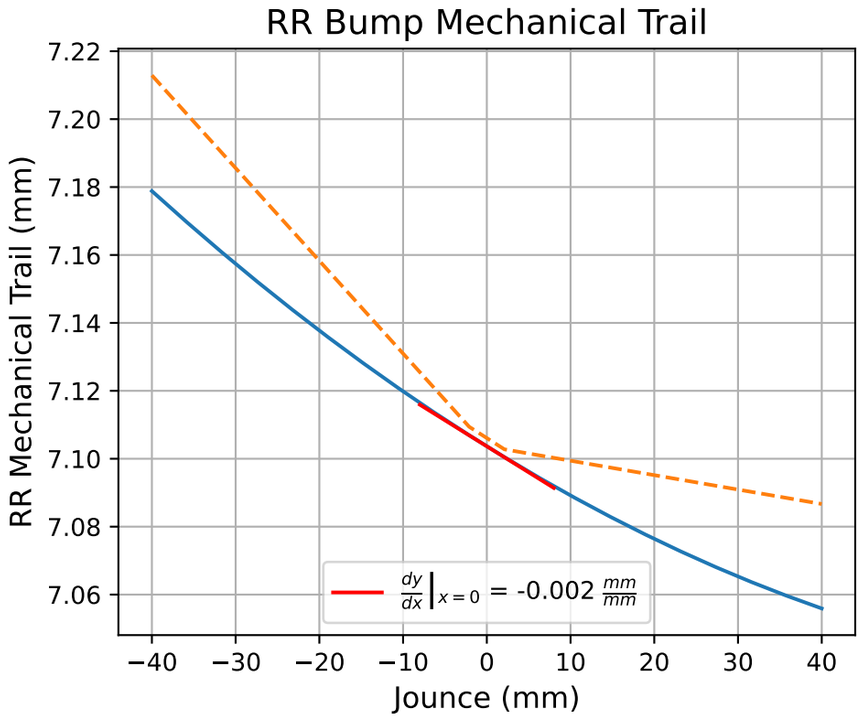
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.0x^2 + 0.057x + 11.6$
FR	$f(x) = 0.0x^3 + 0.0x^2 + 0.057x + 11.6$
RL	$f(x) = 0.0x^3 + 0.0x^2 + 0.057x + 8.061$
RR	$f(x) = 0.0x^3 + 0.0x^2 + 0.057x + 8.061$







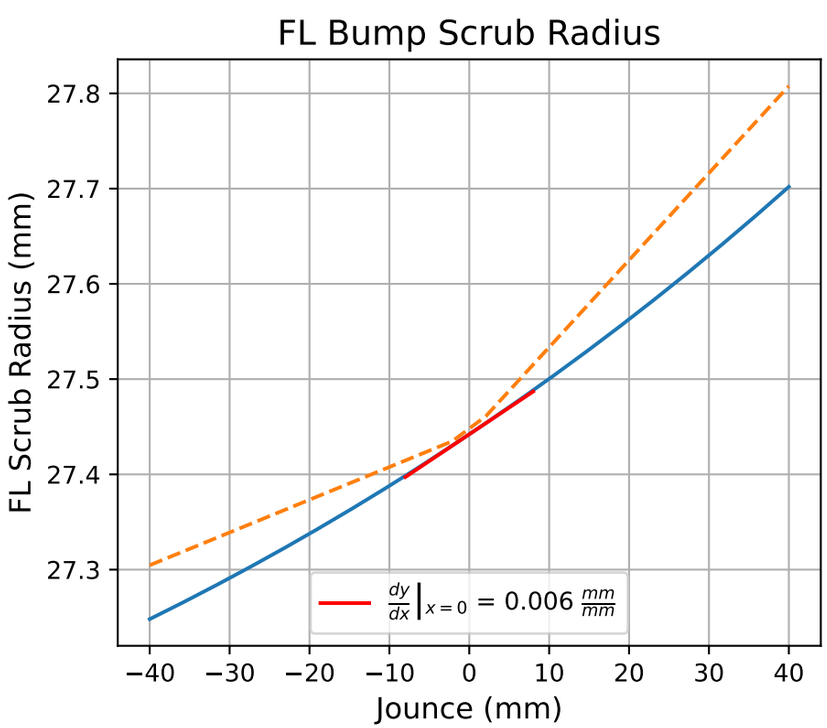


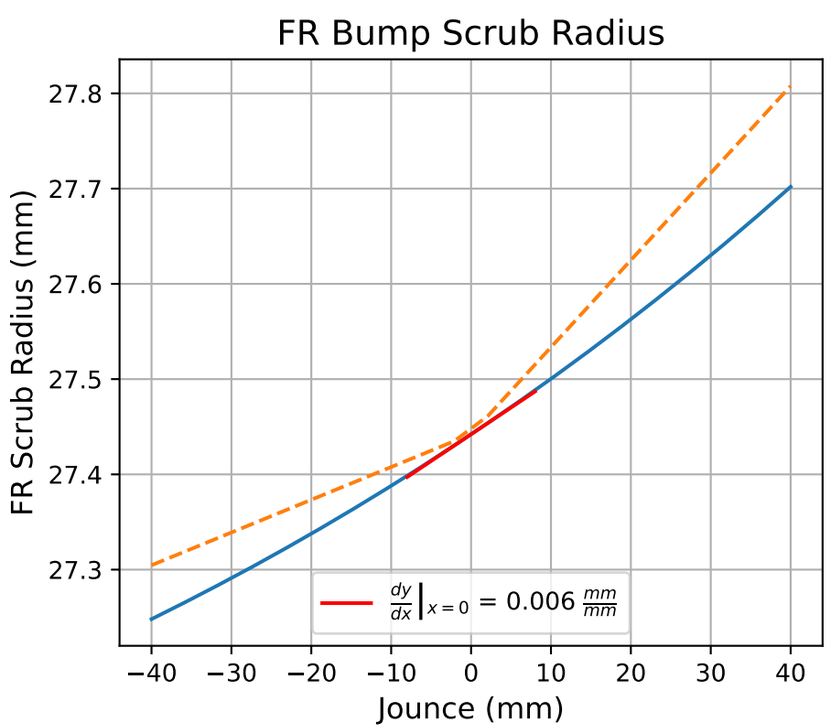
Linear Fit $f(x) = a_1x + a_0$

FL	$f(x) = -0.001x + 4.897$
FR	$f(x) = -0.001x + 4.897$
RL	$f(x) = -0.002x + 7.104$
RR	$f(x) = -0.002x + 7.104$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

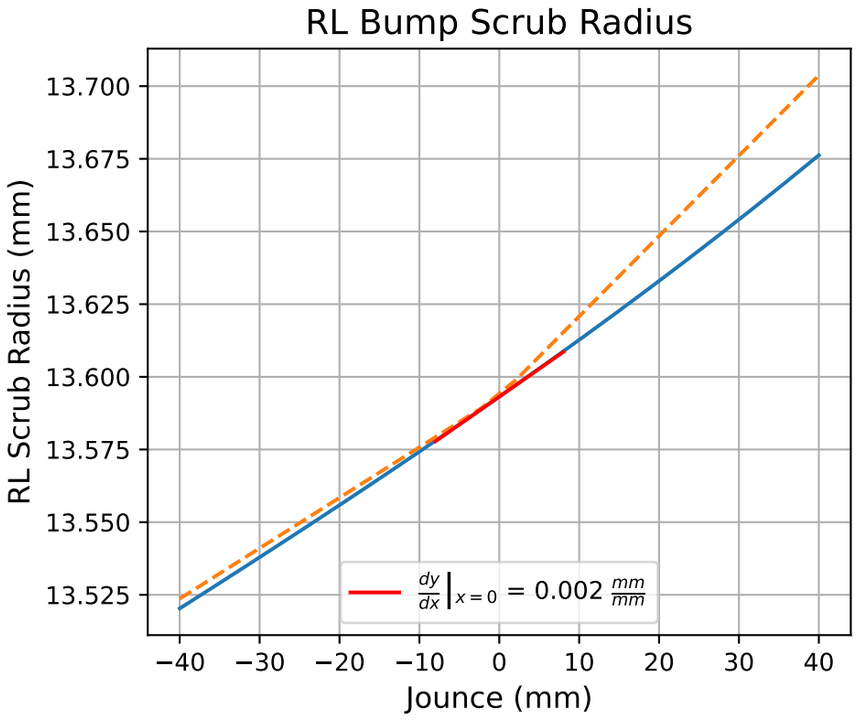
FL	$f(x) = 0.0x^3 + -0.0x^2 + -0.001x + 4.897$
FR	$f(x) = 0.0x^3 + -0.0x^2 + -0.001x + 4.897$
RL	$f(x) = -0.0x^3 + 0.0x^2 + -0.002x + 7.104$
RR	$f(x) = -0.0x^3 + 0.0x^2 + -0.002x + 7.104$

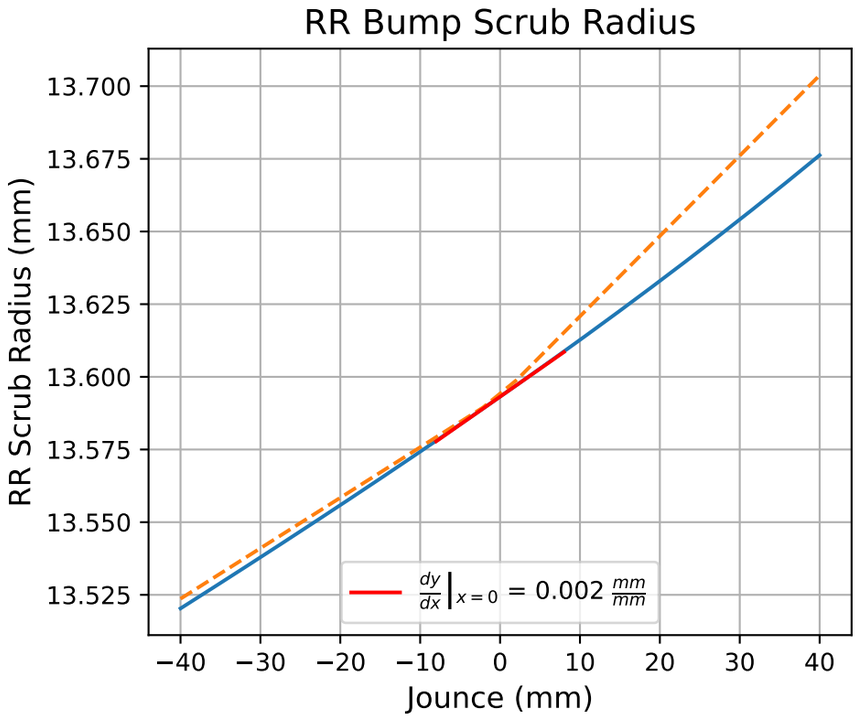




Linear Fit $f(x) = a_1x + a_0$

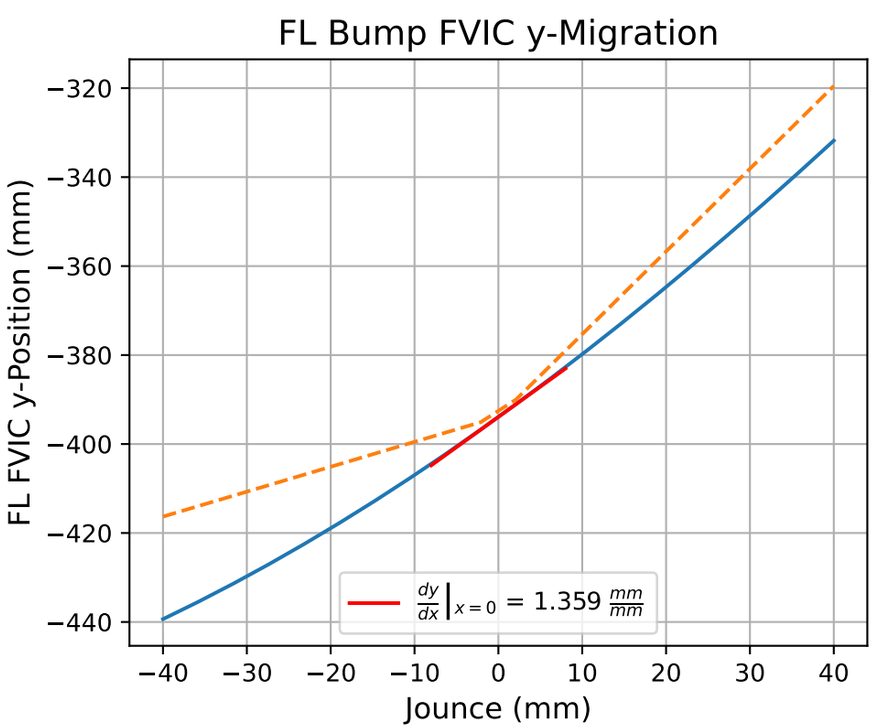
FL	$f(x) = 0.006x + 27.442$
FR	$f(x) = 0.006x + 27.442$
RL	$f(x) = 0.002x + 13.593$
RR	$f(x) = 0.002x + 13.593$

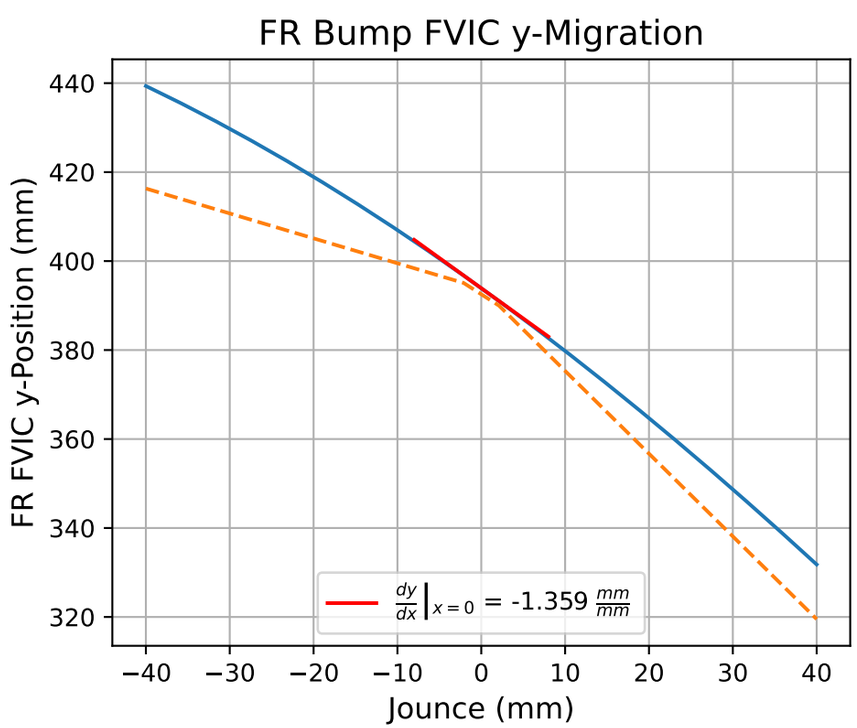


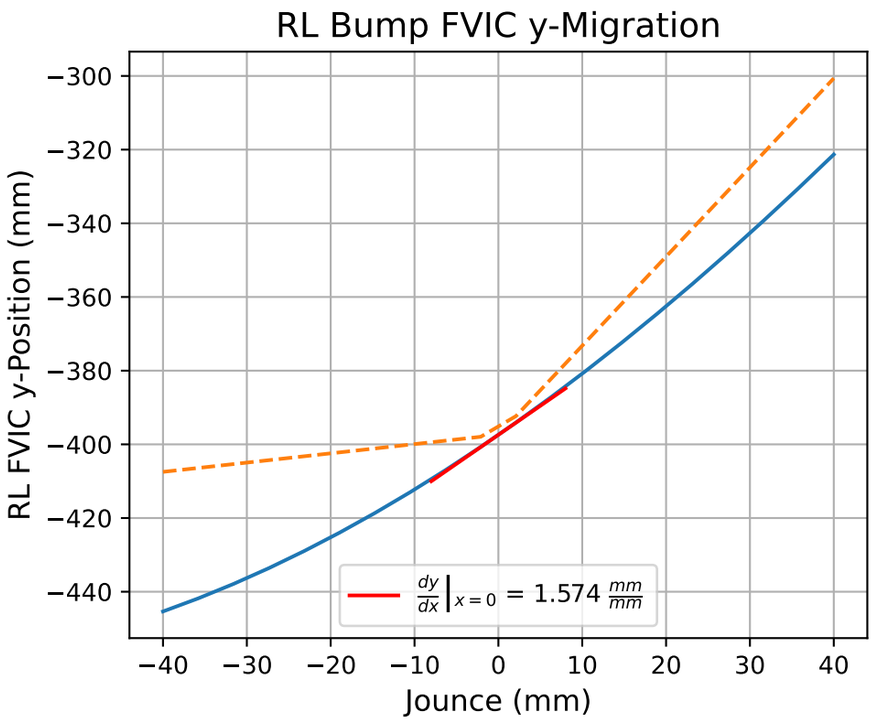


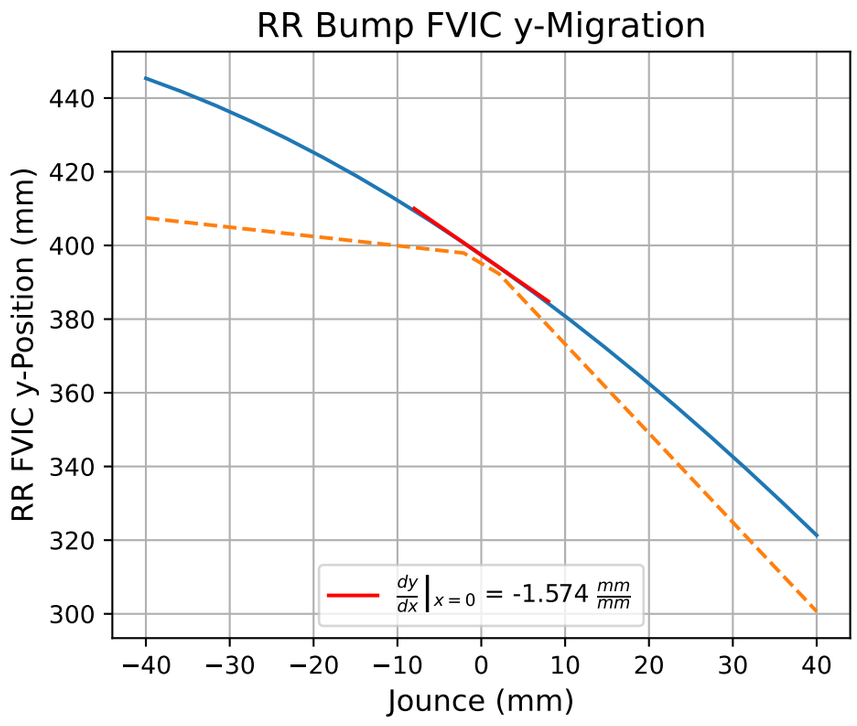
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.0x^2 + 0.006x + 27.442$
FR	$f(x) = 0.0x^3 + 0.0x^2 + 0.006x + 27.442$
RL	$f(x) = 0.0x^3 + 0.0x^2 + 0.002x + 13.593$
RR	$f(x) = 0.0x^3 + 0.0x^2 + 0.002x + 13.593$







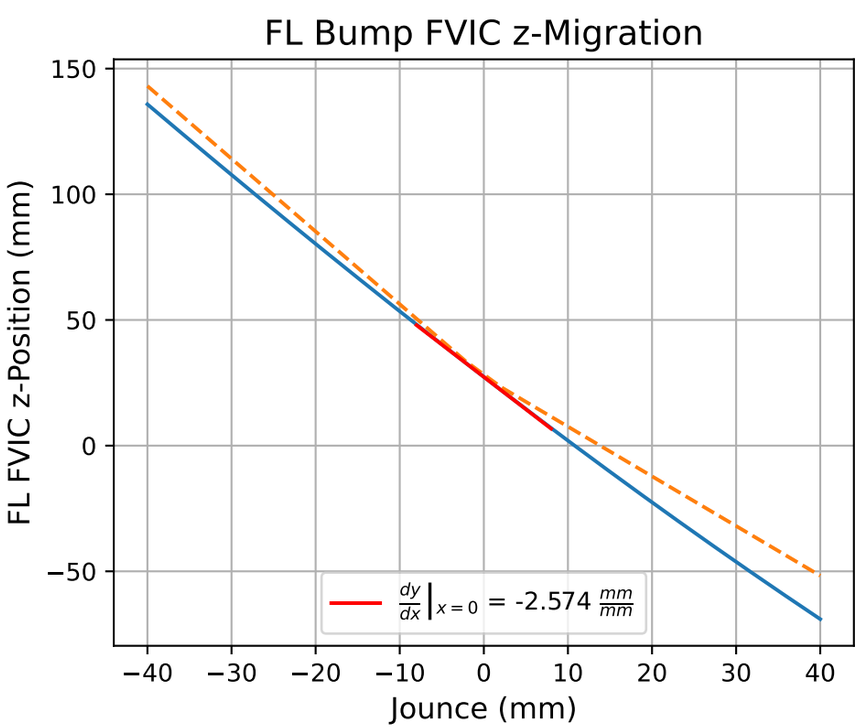


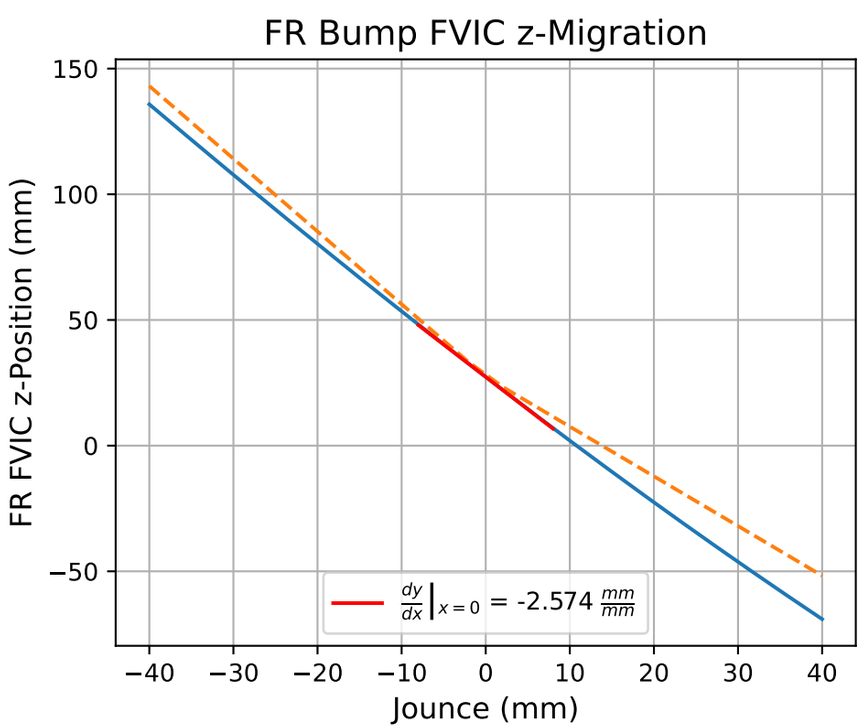
Linear Fit $f(x) = a_1x + a_0$

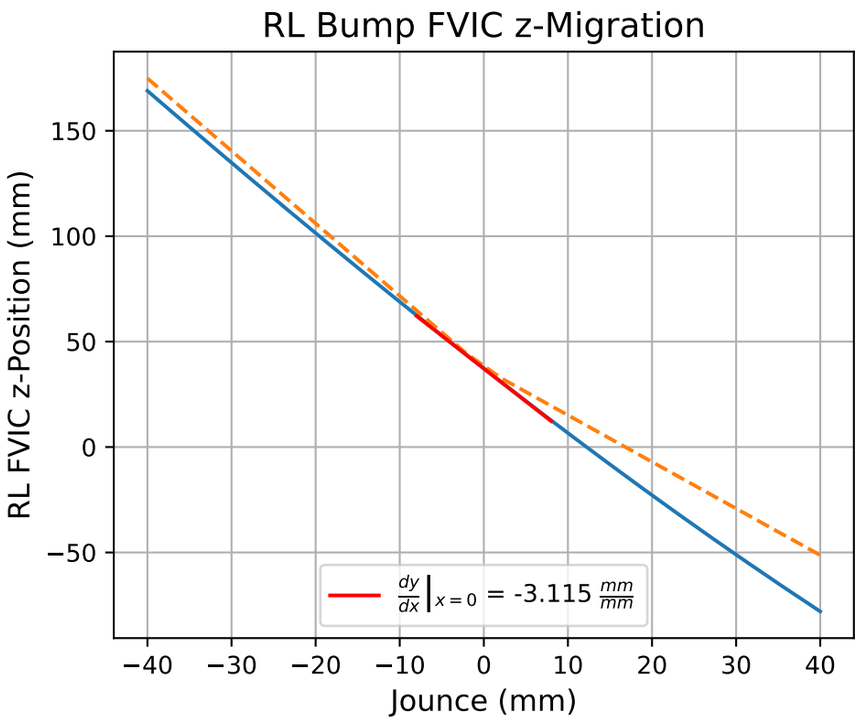
FL	$f(x) = 1.359x + -393.907$
FR	$f(x) = -1.359x + 393.907$
RL	$f(x) = 1.574x + -397.417$
RR	$f(x) = -1.574x + 397.417$

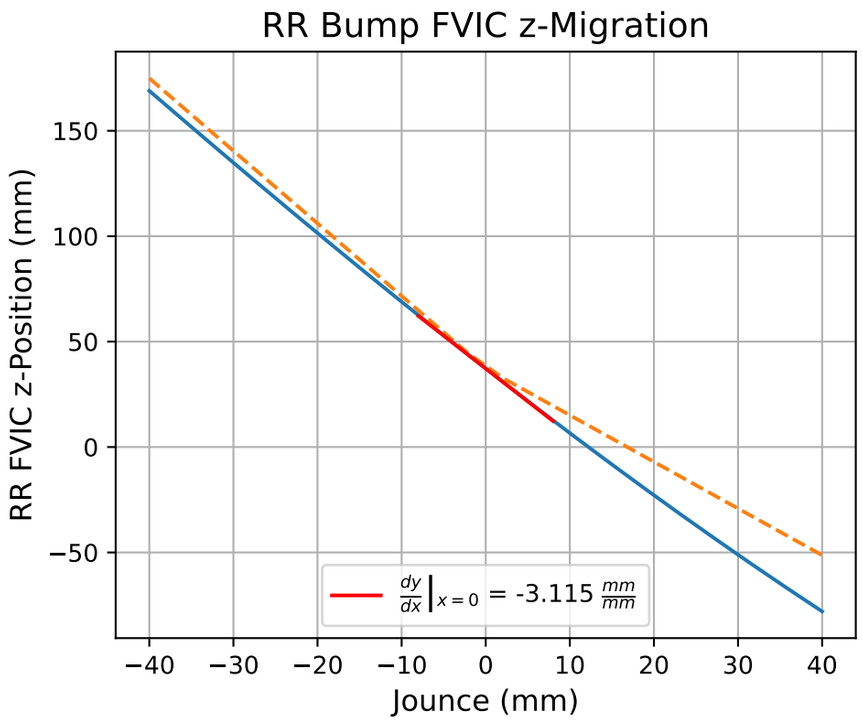
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.0x^3 + 0.005x^2 + 1.359x + -393.906$
FR	$f(x) = 0.0x^3 + -0.005x^2 + -1.359x + 393.906$
RL	$f(x) = -0.0x^3 + 0.009x^2 + 1.574x + -397.413$
RR	$f(x) = 0.0x^3 + -0.009x^2 + -1.574x + 397.413$







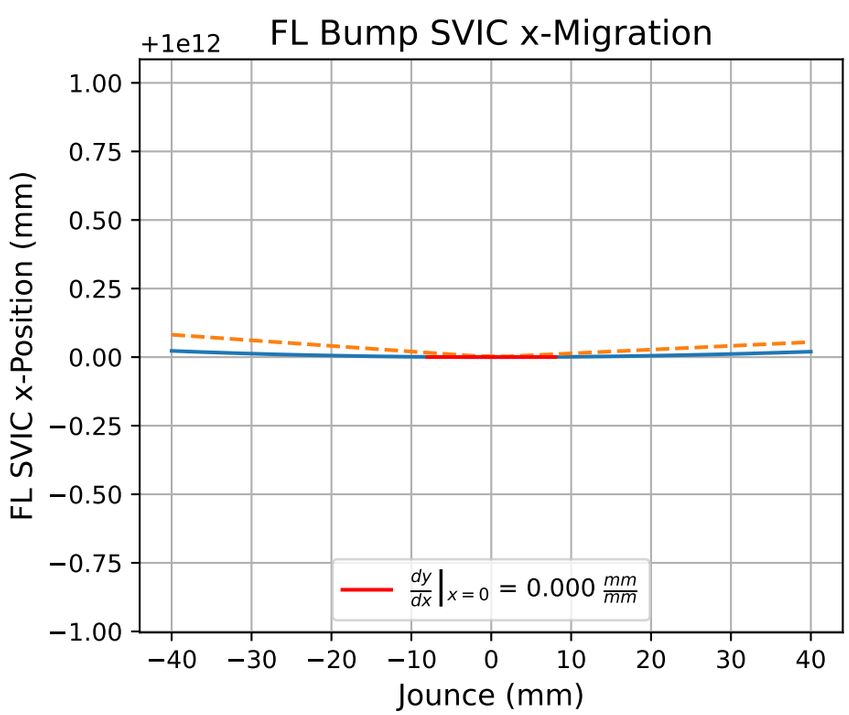


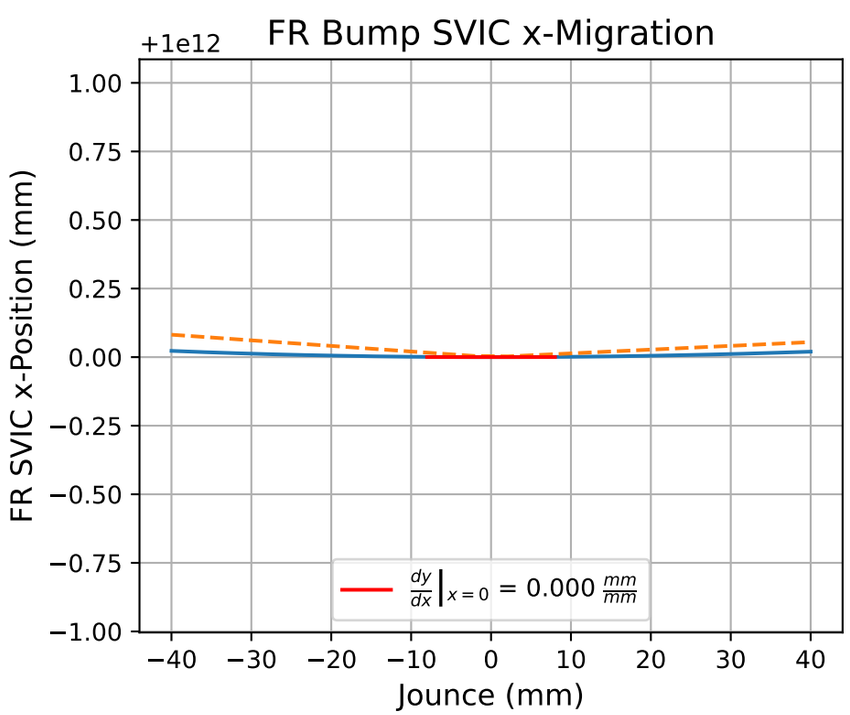
Linear Fit $f(x) = a_1x + a_0$

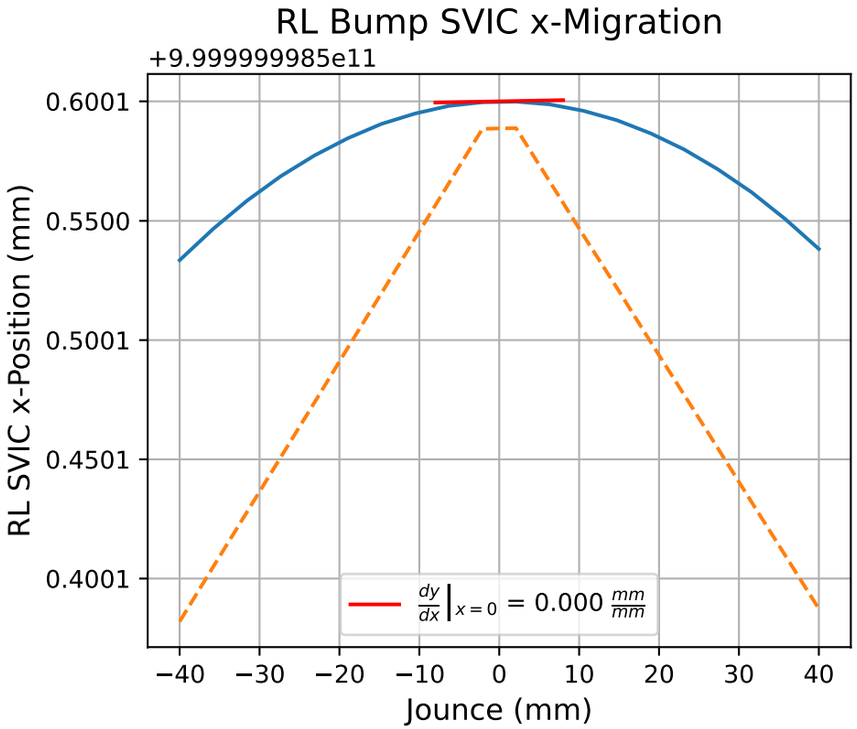
FL	$f(x) = -2.574x + 27.34$
FR	$f(x) = -2.574x + 27.34$
RL	$f(x) = -3.115x + 37.239$
RR	$f(x) = -3.115x + 37.239$

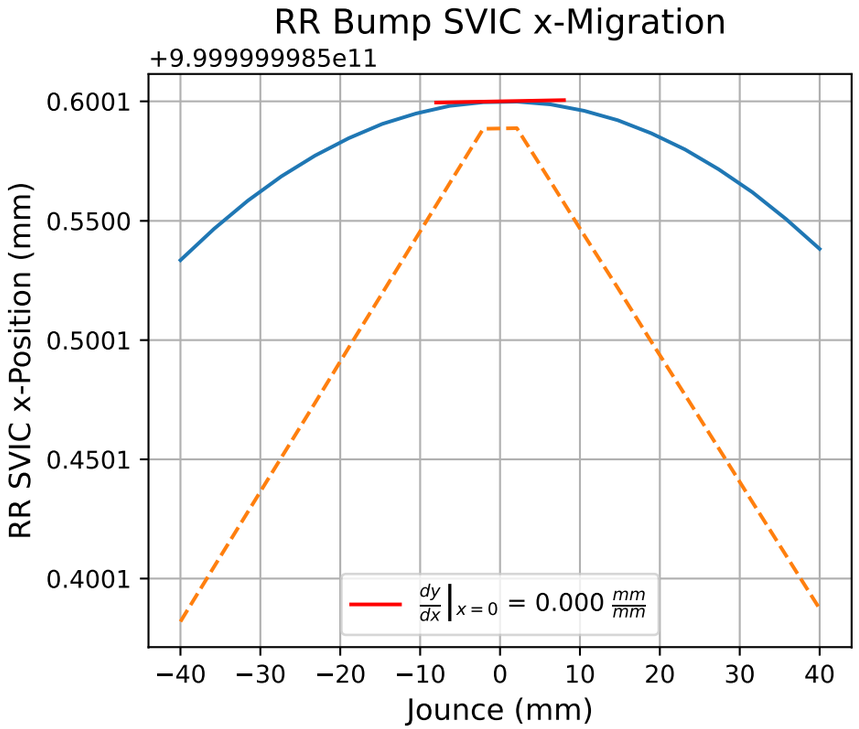
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.004x^2 + -2.574x + 27.343$
FR	$f(x) = 0.0x^3 + 0.004x^2 + -2.574x + 27.343$
RL	$f(x) = 0.0x^3 + 0.005x^2 + -3.115x + 37.245$
RR	$f(x) = 0.0x^3 + 0.005x^2 + -3.115x + 37.245$







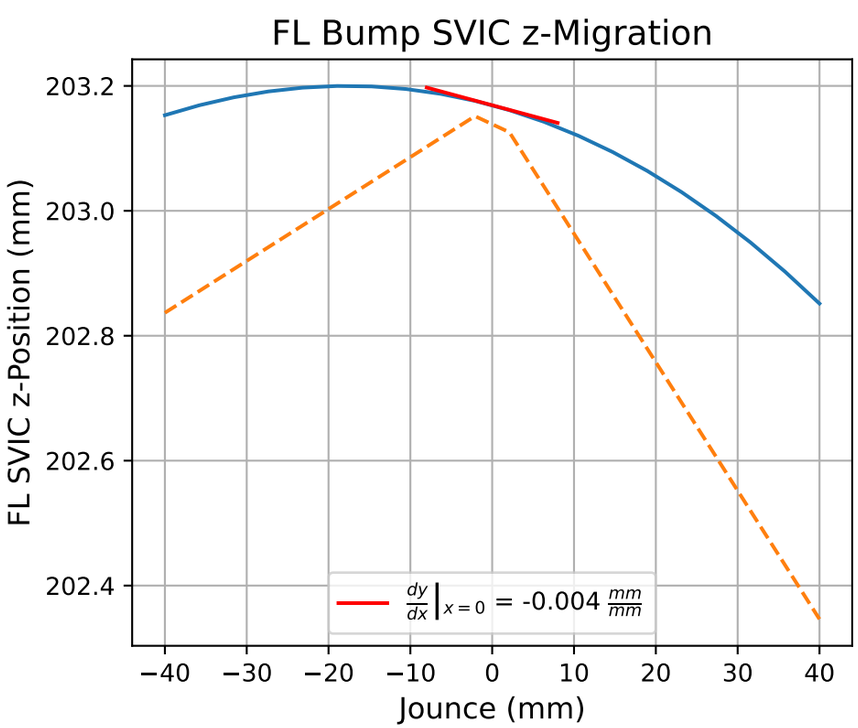


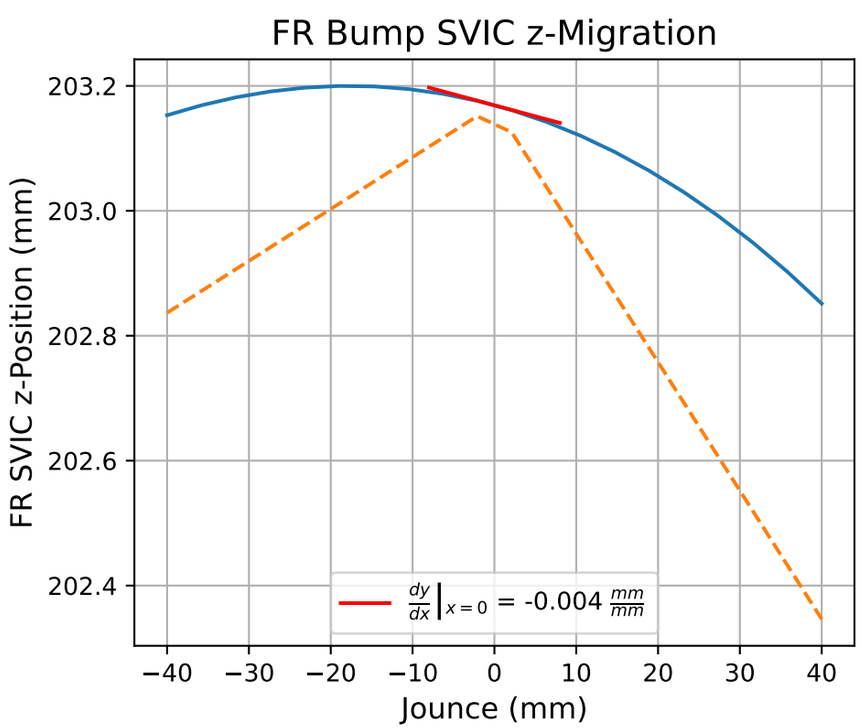
Linear Fit $f(x) = a_1x + a_0$

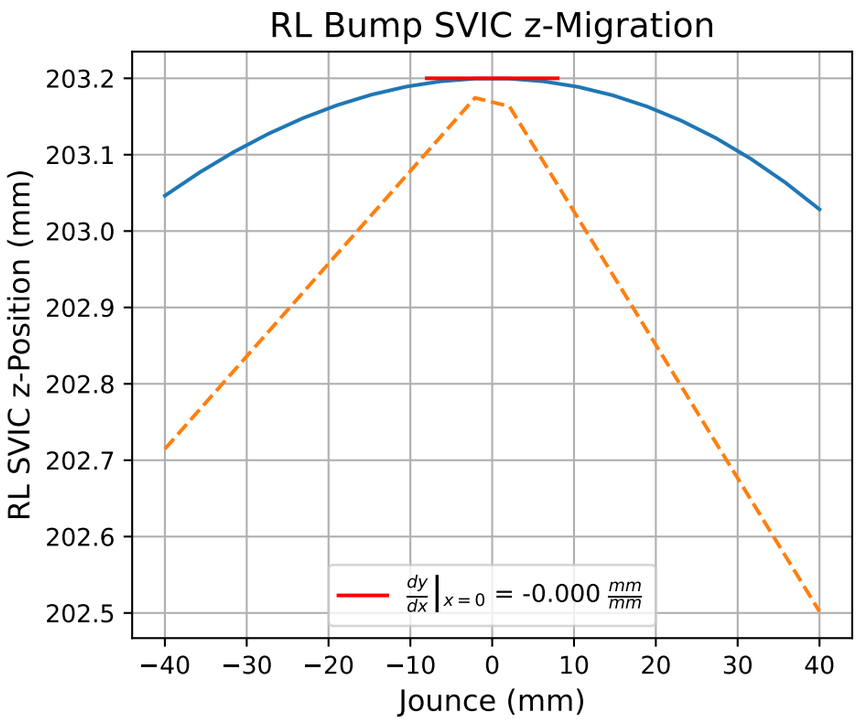
FL	$f(x) = 0.0x + 1.000e+12$
FR	$f(x) = 0.0x + 1.000e+12$
RL	$f(x) = 0.0x + 1.000e+12$
RR	$f(x) = 0.0x + 1.000e+12$

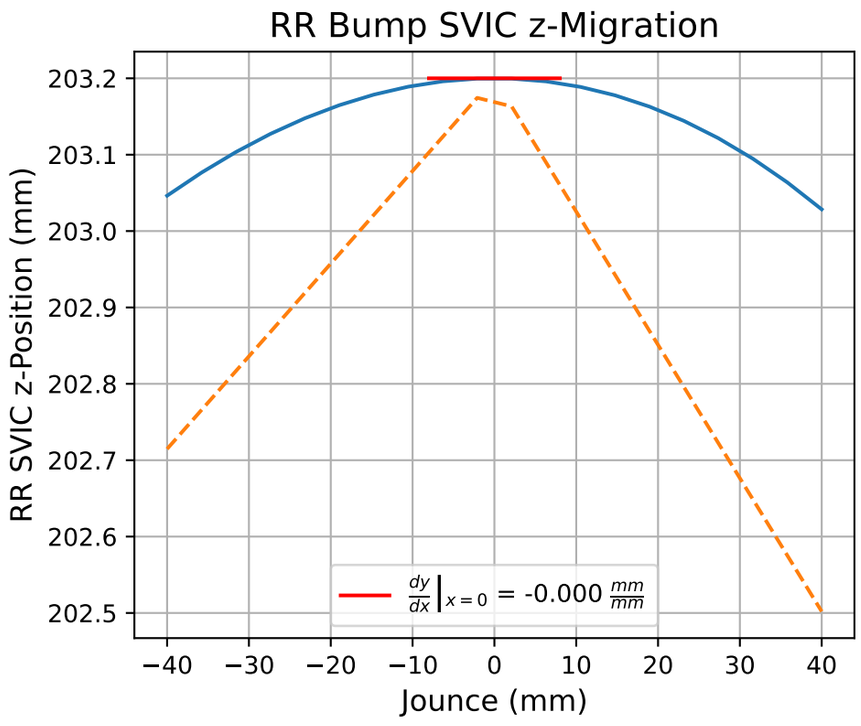
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.0x^2 + -0.0x + 1.0e+12$
FR	$f(x) = 0.0x^3 + 0.0x^2 + -0.0x + 1.0e+12$
RL	$f(x) = 0.0x^3 + -0.0x^2 + 0.0x + 1.0e+12$
RR	$f(x) = 0.0x^3 + -0.0x^2 + 0.0x + 1.0e+12$









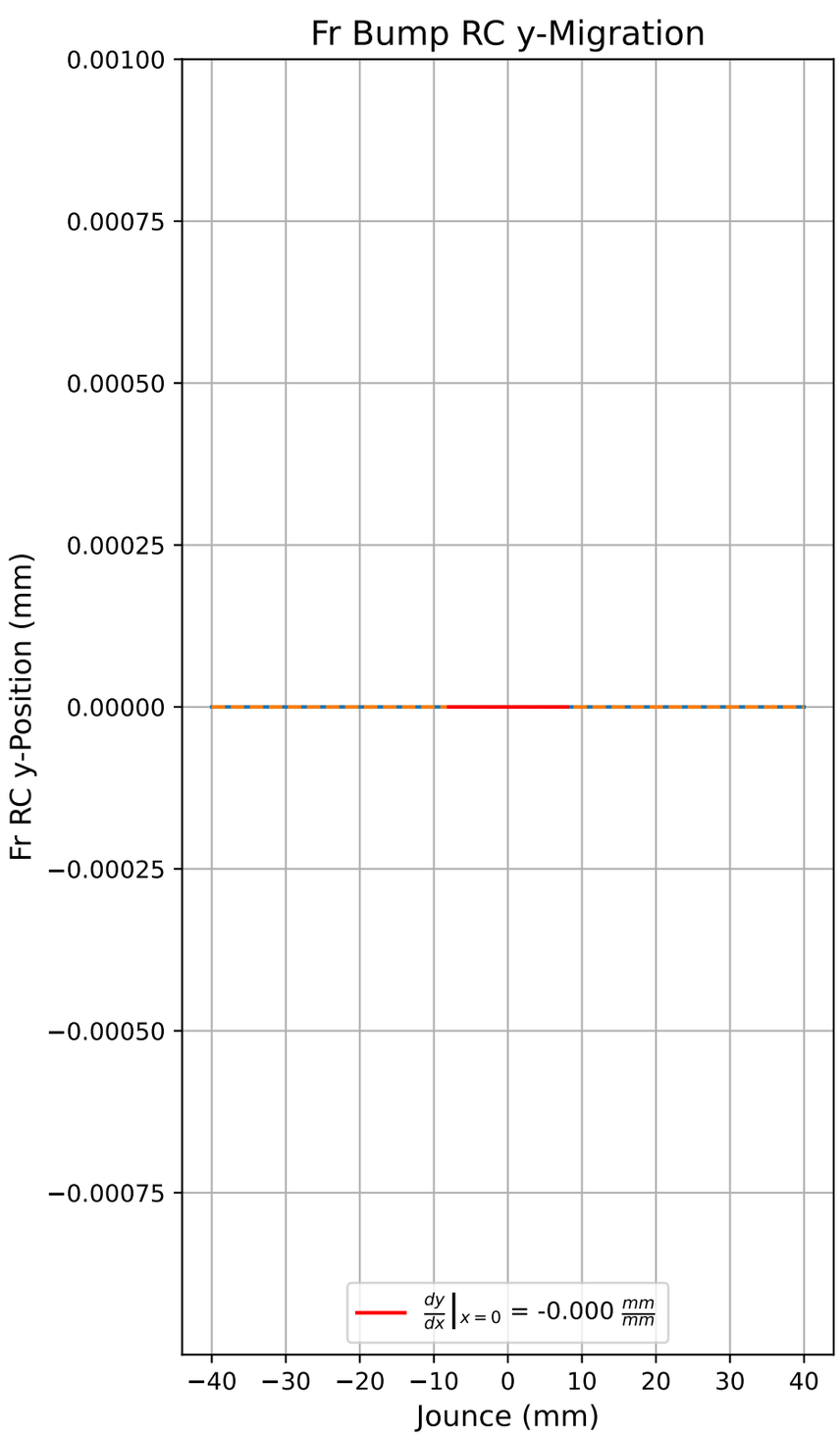
Full Model
FMU

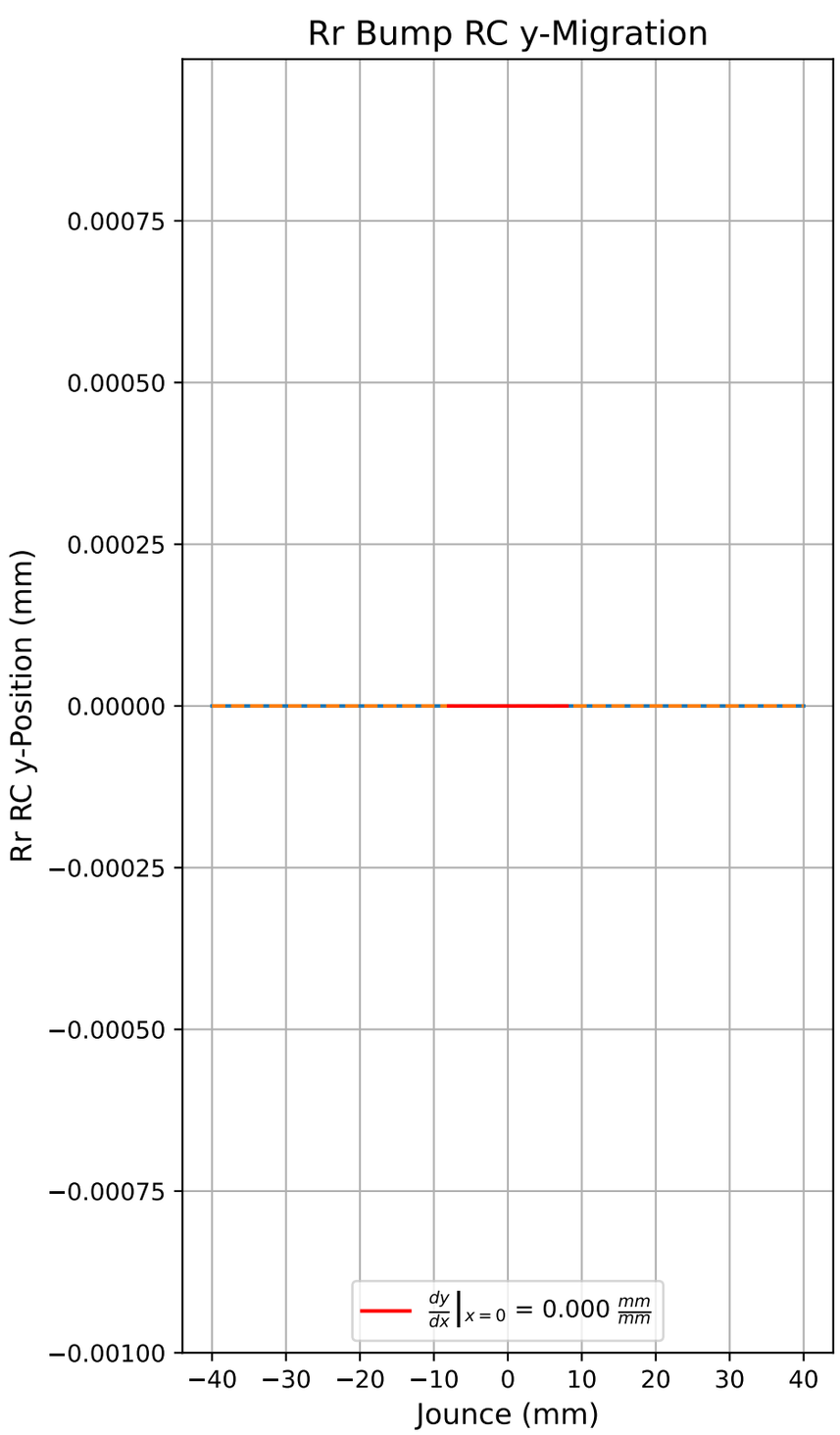
Linear Fit $f(x) = a_1x + a_0$

FL	$f(x) = -0.004x + 203.169$
FR	$f(x) = -0.004x + 203.169$
RL	$f(x) = -0.0x + 203.2$
RR	$f(x) = -0.0x + 203.2$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.0x^3 + -0.0x^2 + -0.004x + 203.169$
FR	$f(x) = -0.0x^3 + -0.0x^2 + -0.004x + 203.169$
RL	$f(x) = -0.0x^3 + -0.0x^2 + 0.0x + 203.2$
RR	$f(x) = -0.0x^3 + -0.0x^2 + 0.0x + 203.2$



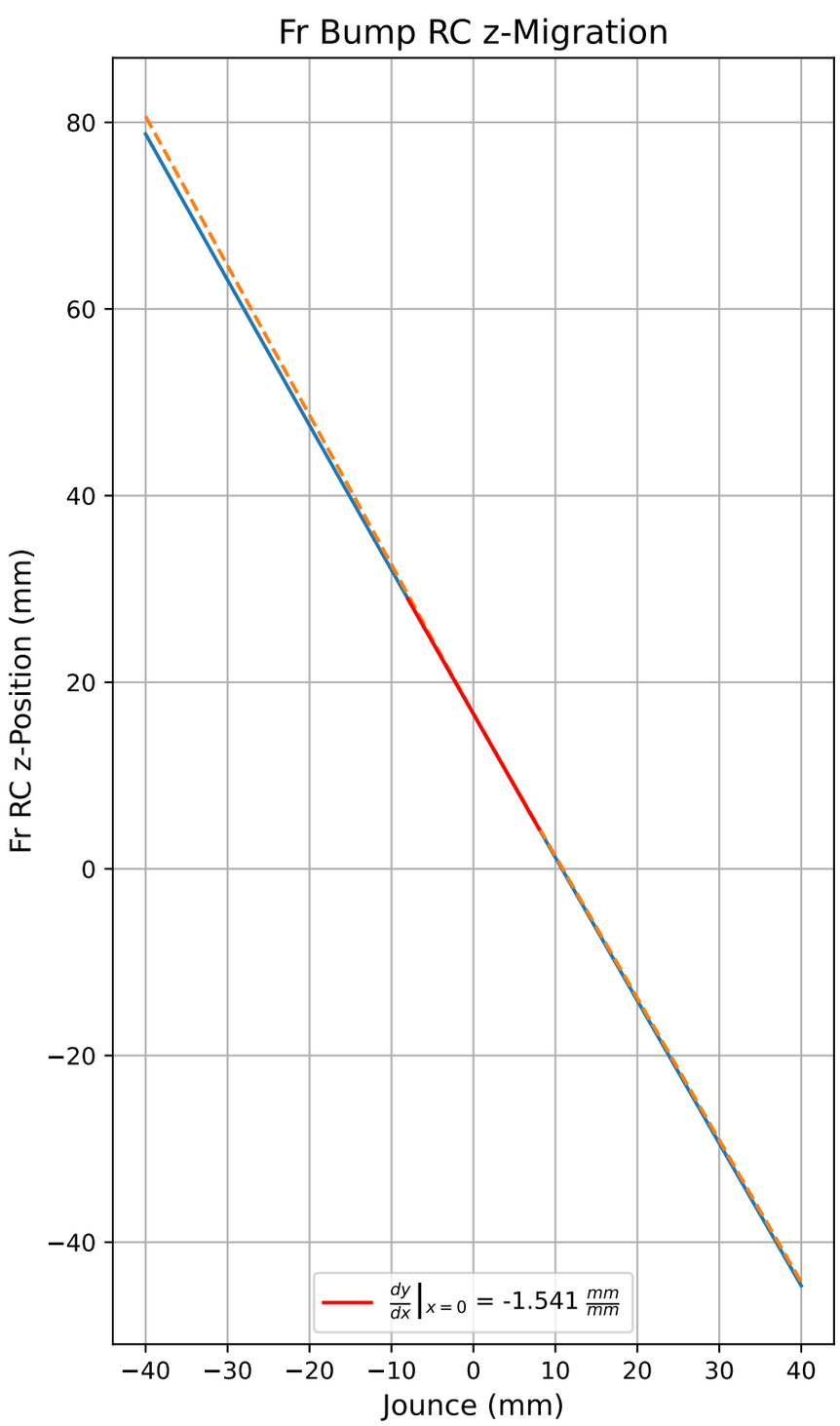


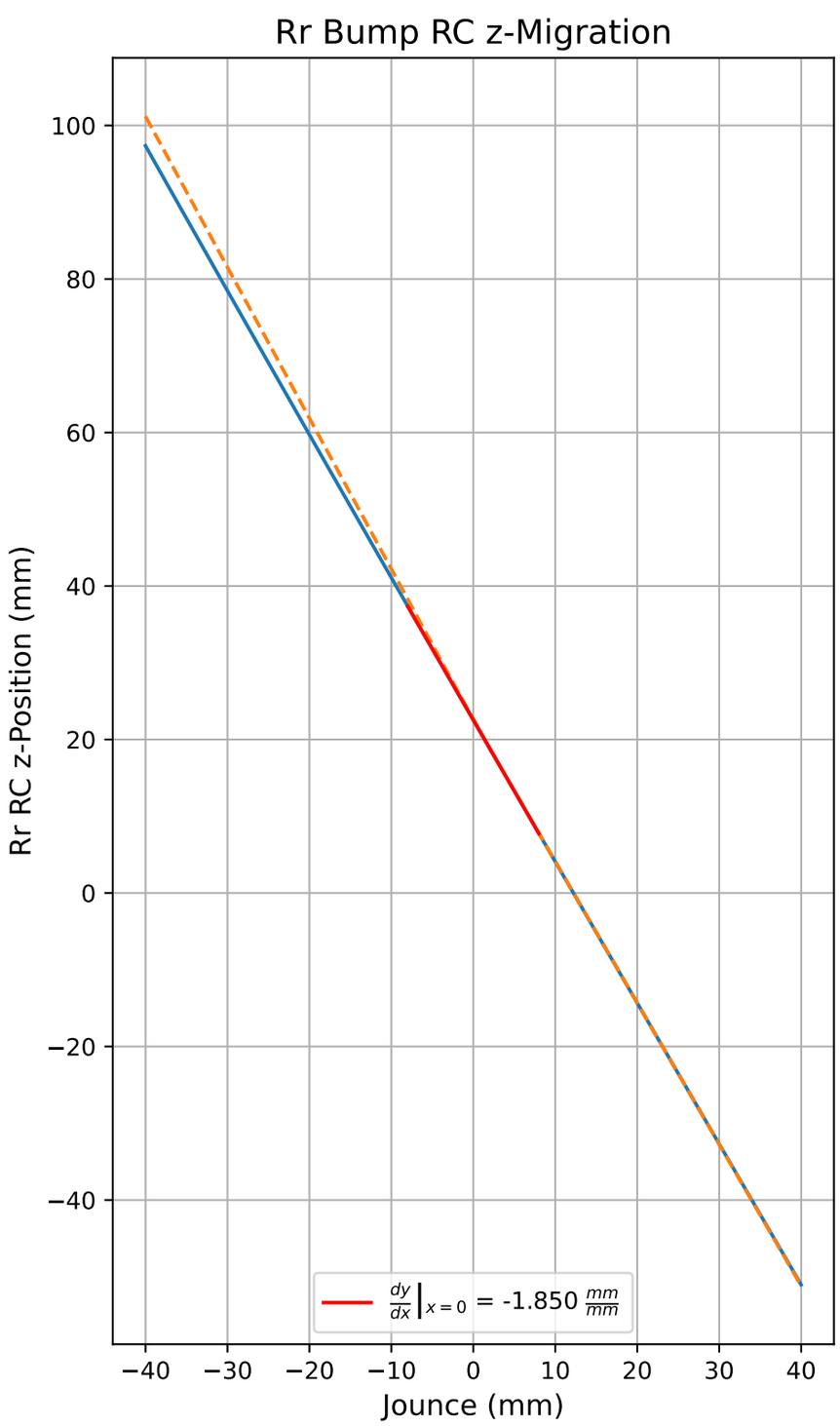
Linear Fit $f(x) = a_1x + a_0$

Fr	$f(x) = -0.0x + -0.0$
Rr	$f(x) = 0.0x + -0.0$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

Fr	$f(x) = -0.0x^3 + -0.0x^2 + 0.0x + 0.0$
Rr	$f(x) = 0.0x^3 + 0.0x^2 + -0.0x + -0.0$



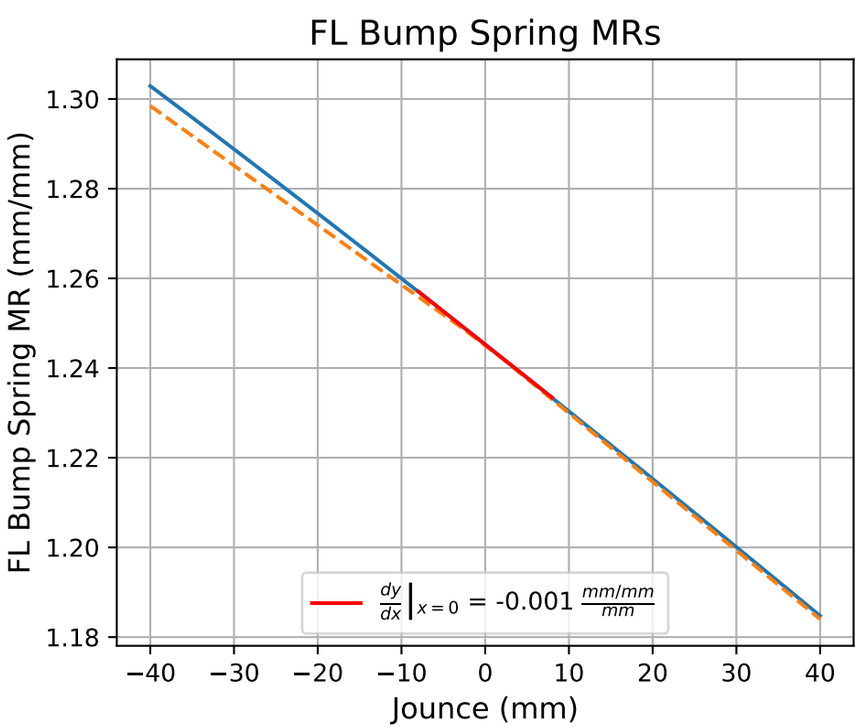


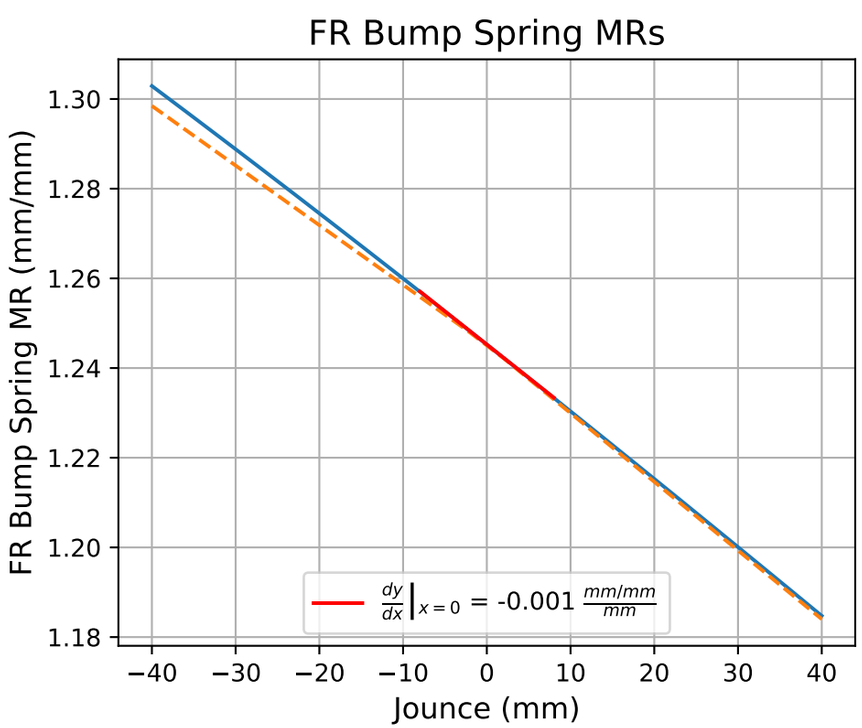
Linear Fit $f(x) = a_1x + a_0$

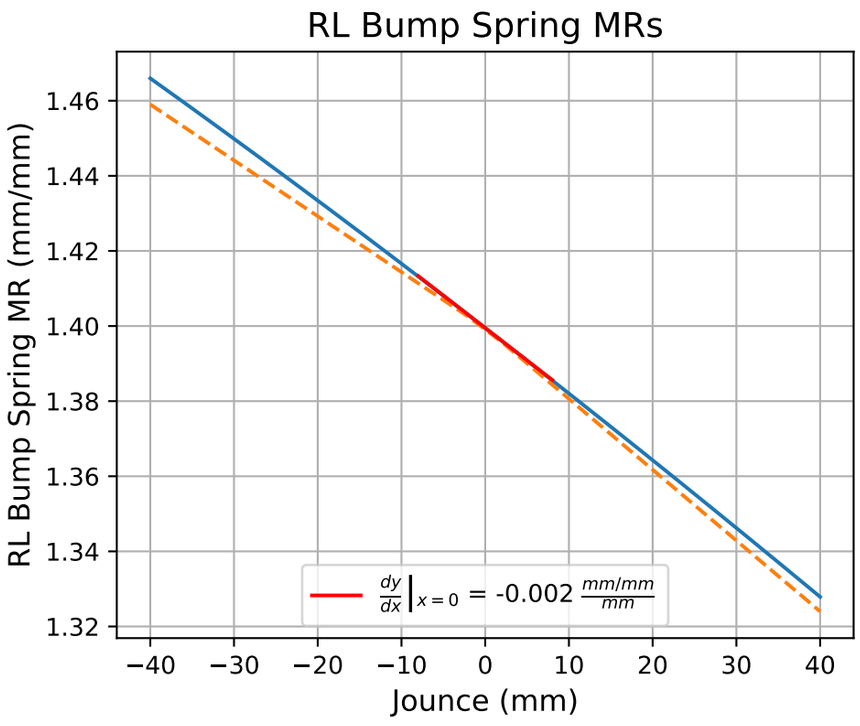
Fr	$f(x) = -1.541x + 16.608$
Rr	$f(x) = -1.85x + 22.543$

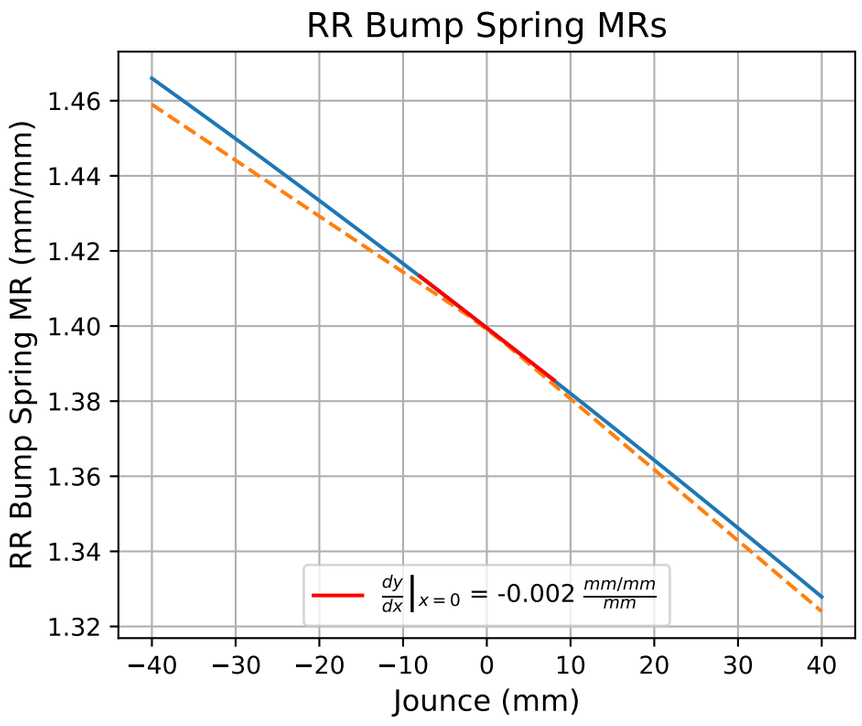
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

Fr	$f(x) = -0.0x^3 + 0.0x^2 + -1.541x + 16.607$
Rr	$f(x) = -0.0x^3 + 0.0x^2 + -1.85x + 22.541$







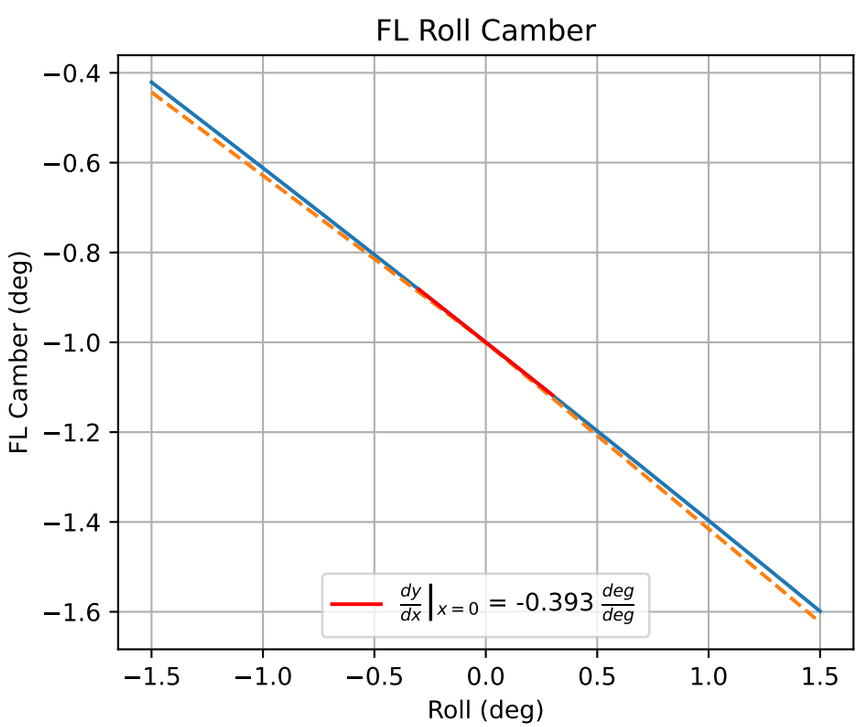


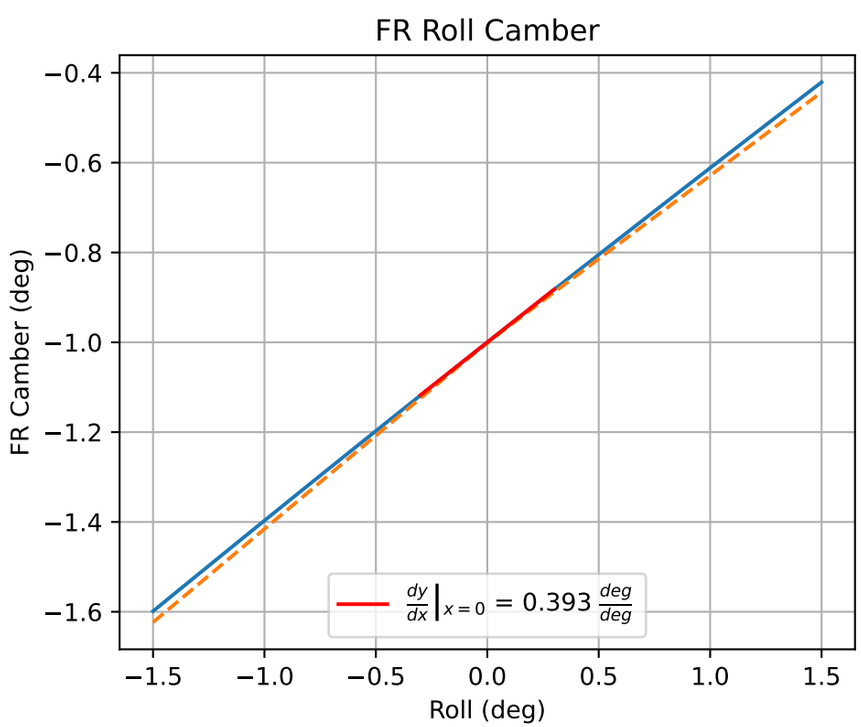
Linear Fit $f(x) = a_1x + a_0$

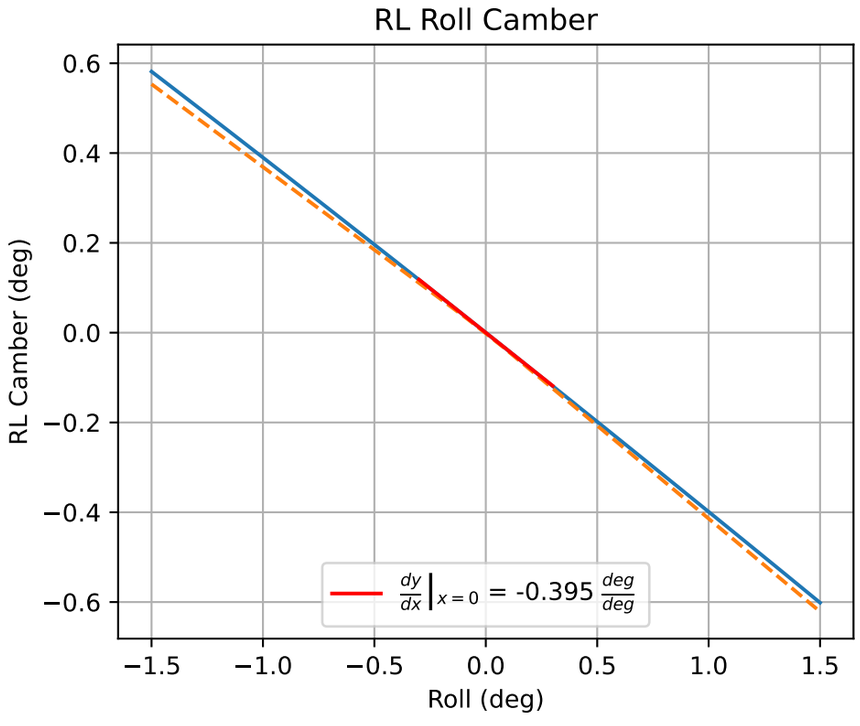
FL	$f(x) = -0.001x + 1.245$
FR	$f(x) = -0.001x + 1.245$
RL	$f(x) = -0.002x + 1.399$
RR	$f(x) = -0.002x + 1.399$

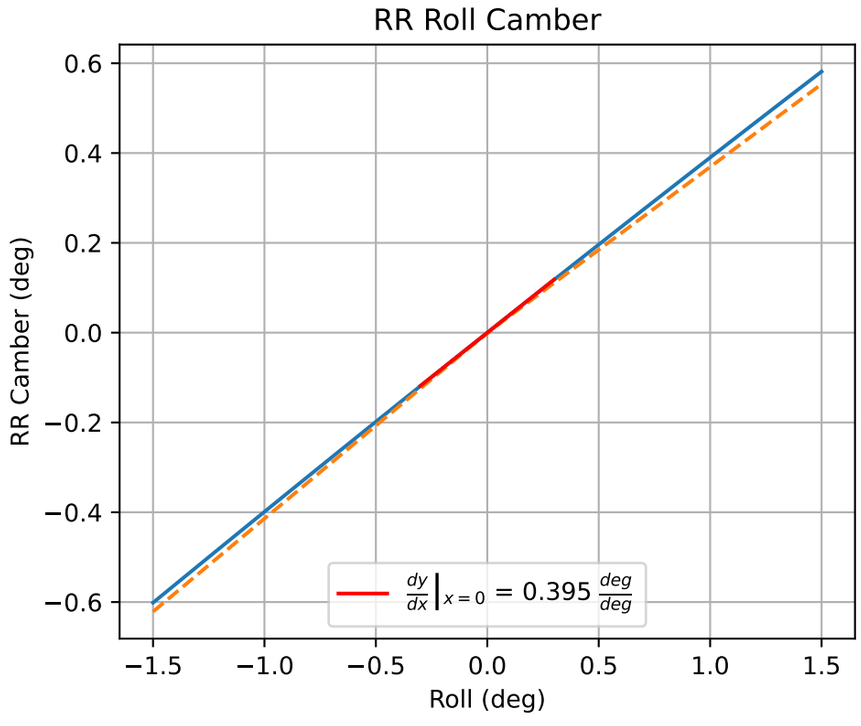
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + -0.0x^2 + -0.001x + 1.245$
FR	$f(x) = 0.0x^3 + -0.0x^2 + -0.001x + 1.245$
RL	$f(x) = 0.0x^3 + -0.0x^2 + -0.002x + 1.399$
RR	$f(x) = 0.0x^3 + -0.0x^2 + -0.002x + 1.399$







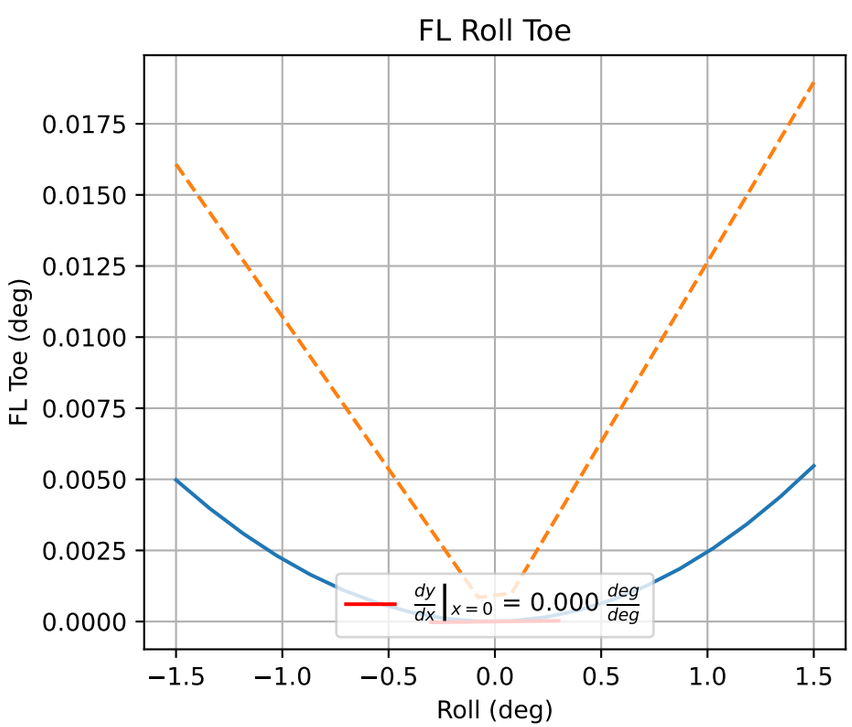


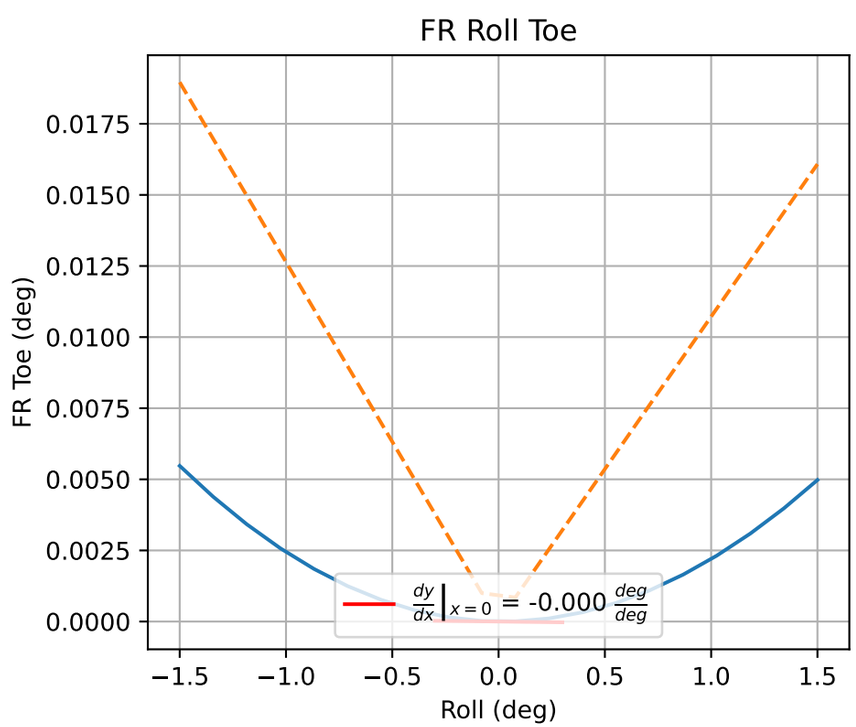
Linear Fit $f(x) = a_1x + a_0$

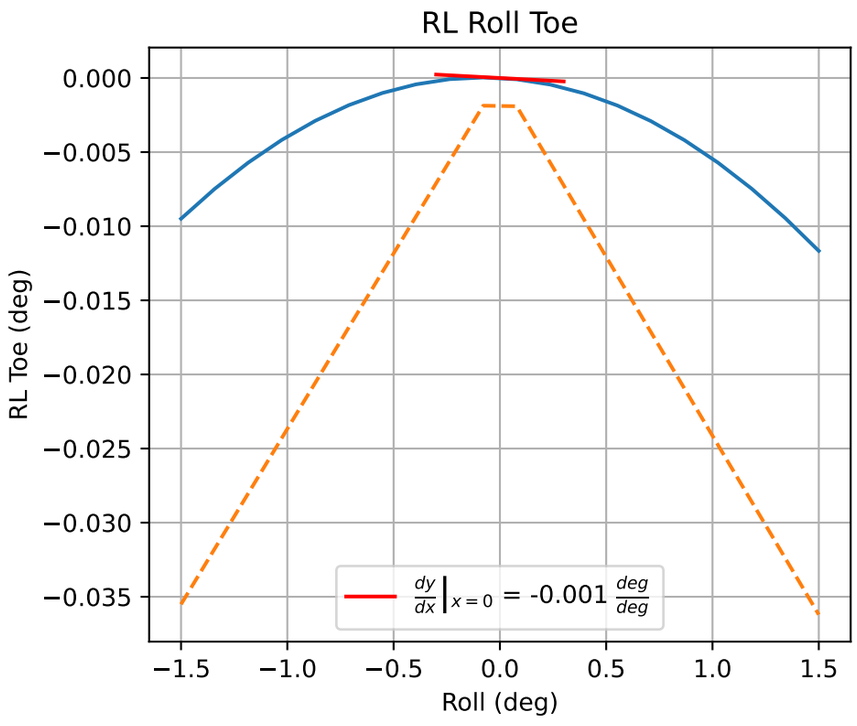
FL	$f(x) = -0.393x + -1.0$
FR	$f(x) = 0.393x + -1.0$
RL	$f(x) = -0.395x + 0.0$
RR	$f(x) = 0.395x + 0.0$

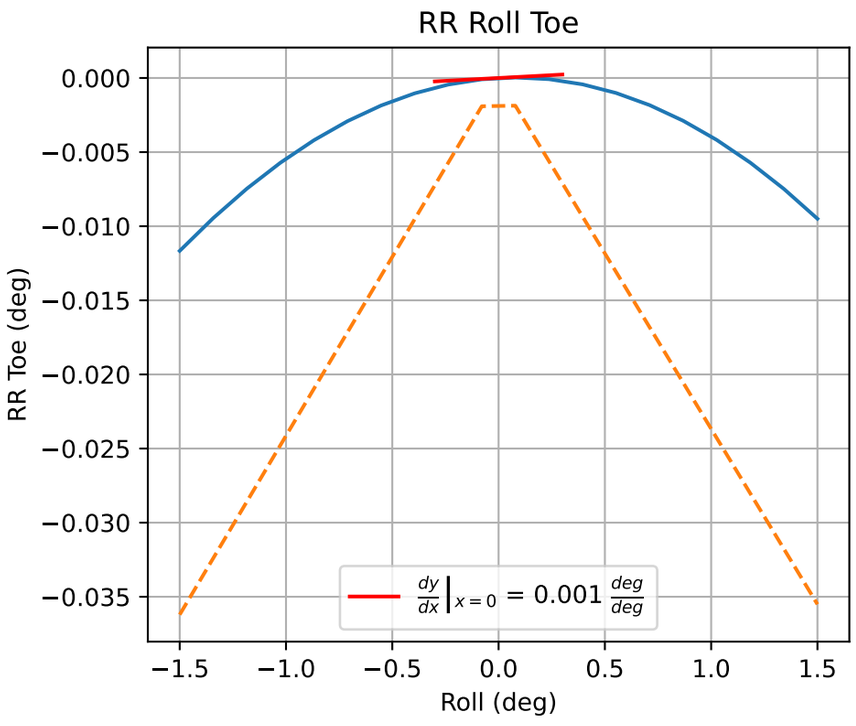
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.0x^3 + -0.004x^2 + -0.393x + -1.0$
FR	$f(x) = 0.0x^3 + -0.004x^2 + 0.393x + -1.0$
RL	$f(x) = 0.0x^3 + -0.004x^2 + -0.395x + 0.0$
RR	$f(x) = -0.0x^3 + -0.004x^2 + 0.395x + 0.0$







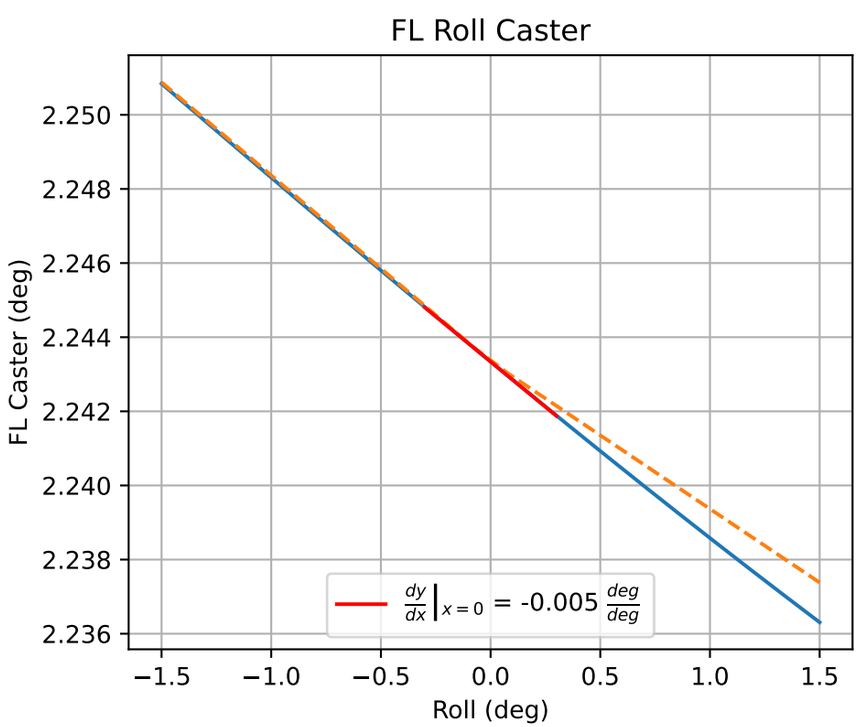


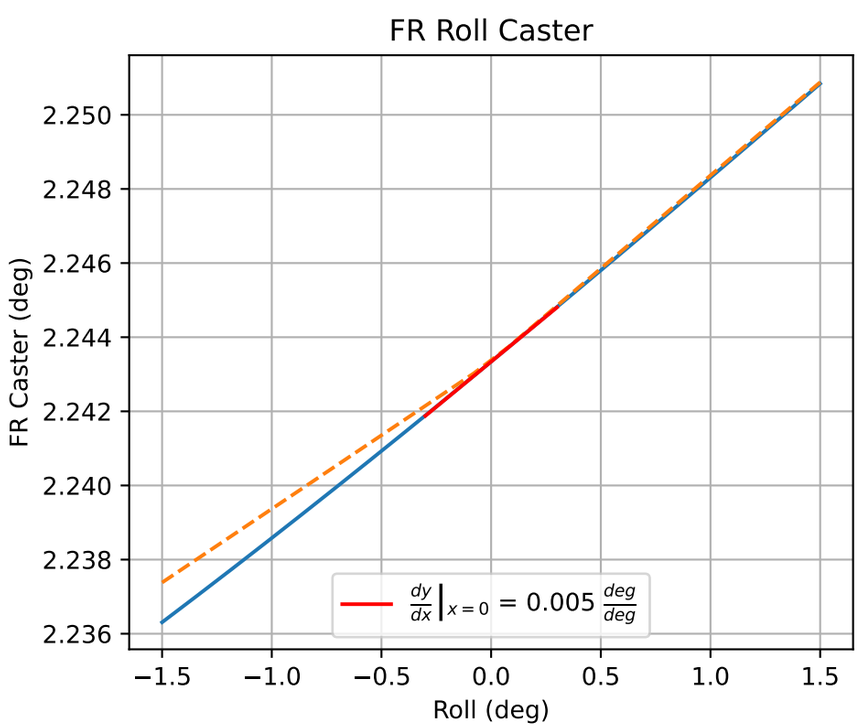
Linear Fit $f(x) = a_1x + a_0$

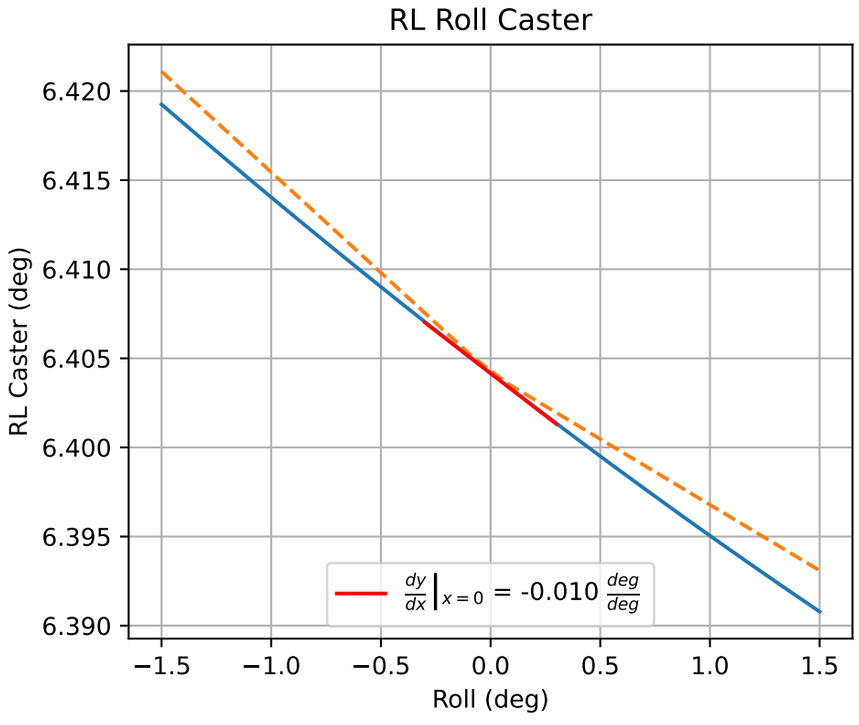
FL	$f(x) = 0.0x + -0.0$
FR	$f(x) = -0.0x + -0.0$
RL	$f(x) = -0.001x + 0.0$
RR	$f(x) = 0.001x + 0.0$

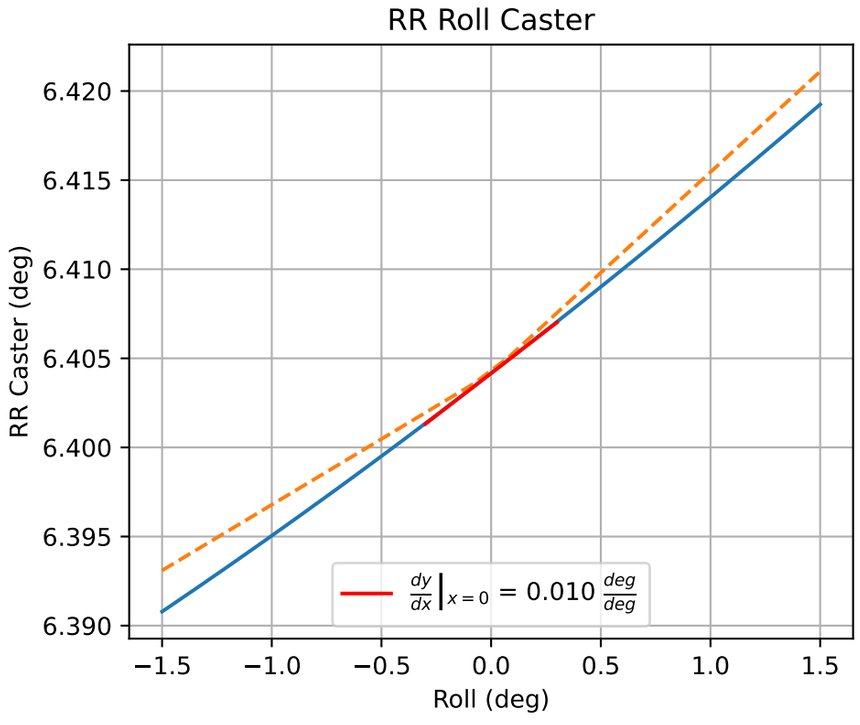
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.002x^2 + 0.0x + -0.0$
FR	$f(x) = -0.0x^3 + 0.002x^2 + -0.0x + -0.0$
RL	$f(x) = 0.0x^3 + -0.005x^2 + -0.001x + 0.0$
RR	$f(x) = -0.0x^3 + -0.005x^2 + 0.001x + 0.0$







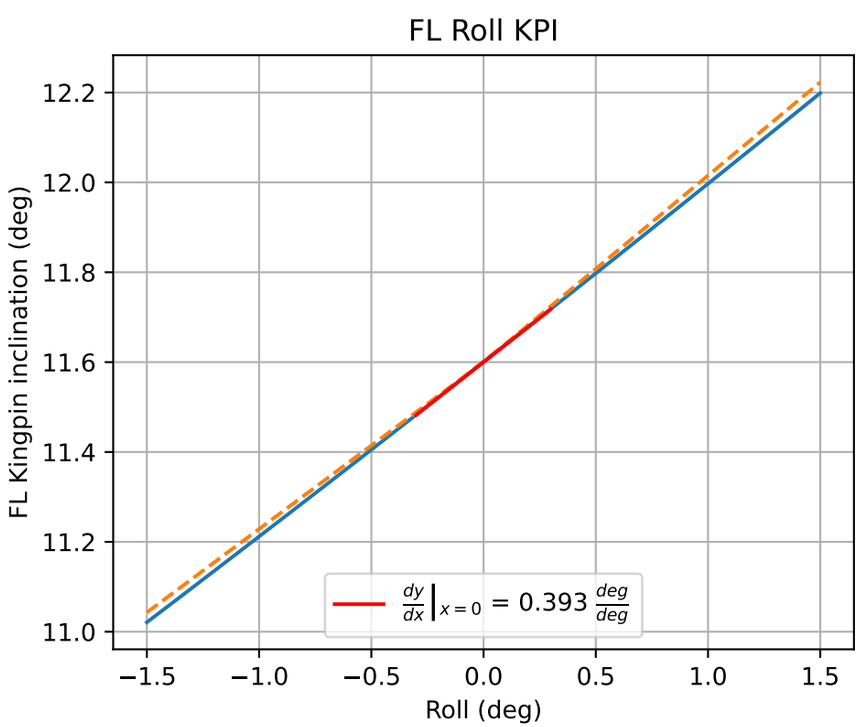


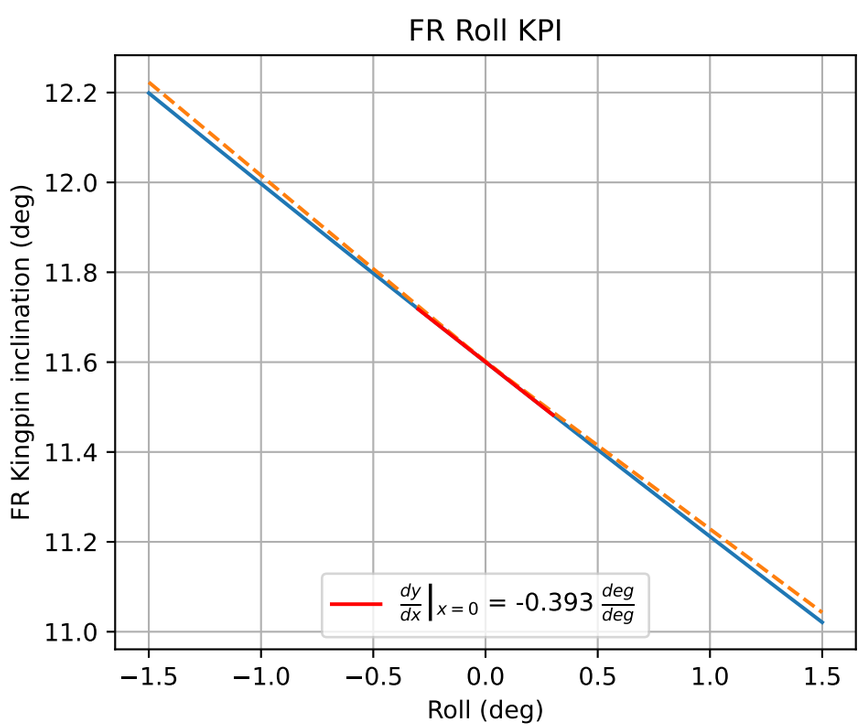
Linear Fit $f(x) = a_1x + a_0$

FL	$f(x) = -0.005x + 2.243$
FR	$f(x) = 0.005x + 2.243$
RL	$f(x) = -0.01x + 6.404$
RR	$f(x) = 0.01x + 6.404$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

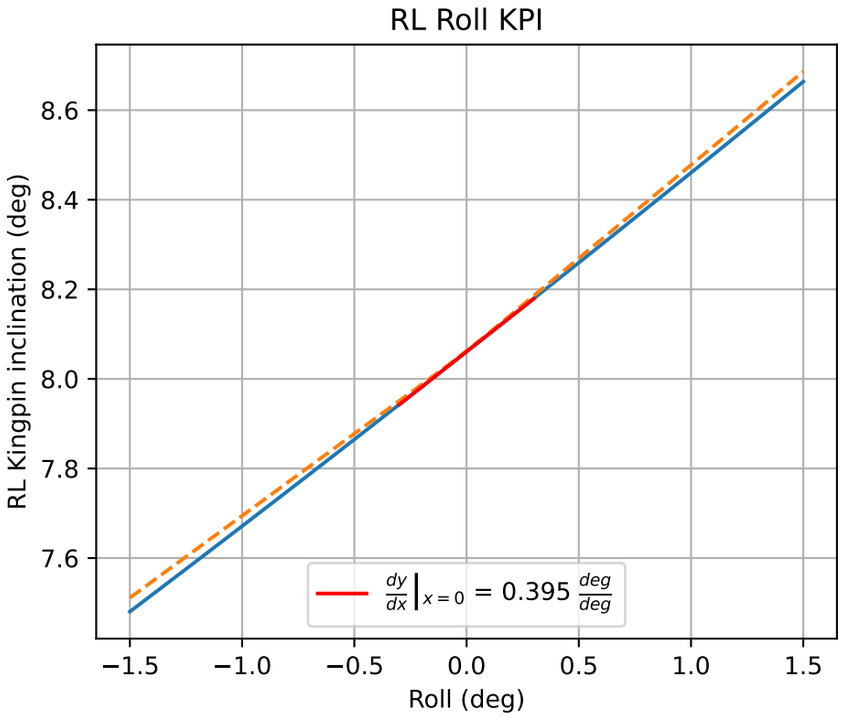
FL	$f(x) = 0.0x^3 + 0.0x^2 + -0.005x + 2.243$
FR	$f(x) = -0.0x^3 + 0.0x^2 + 0.005x + 2.243$
RL	$f(x) = 0.0x^3 + 0.0x^2 + -0.01x + 6.404$
RR	$f(x) = -0.0x^3 + 0.0x^2 + 0.01x + 6.404$

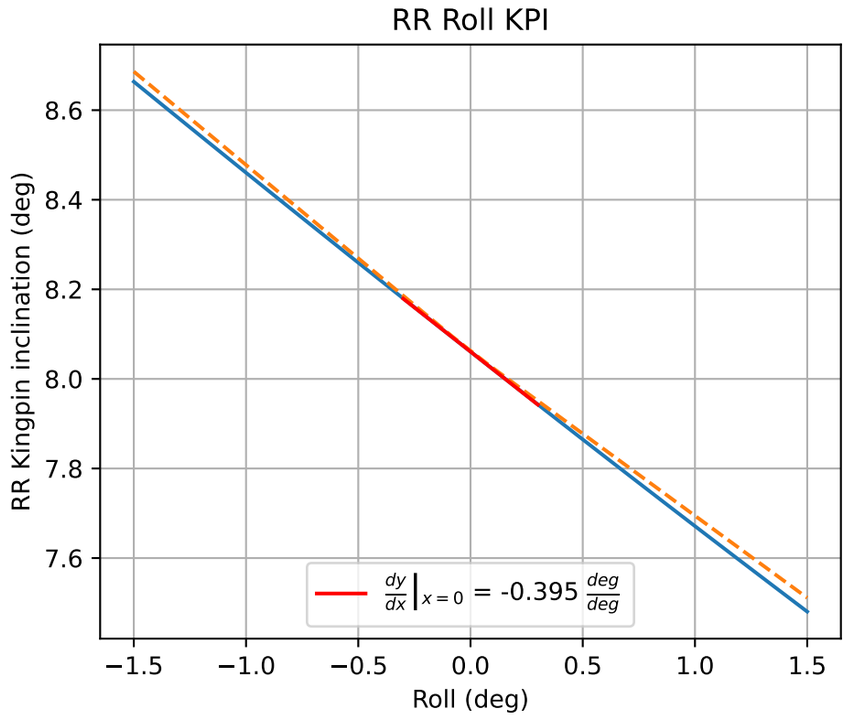




Linear Fit $f(x) = a_1x + a_0$

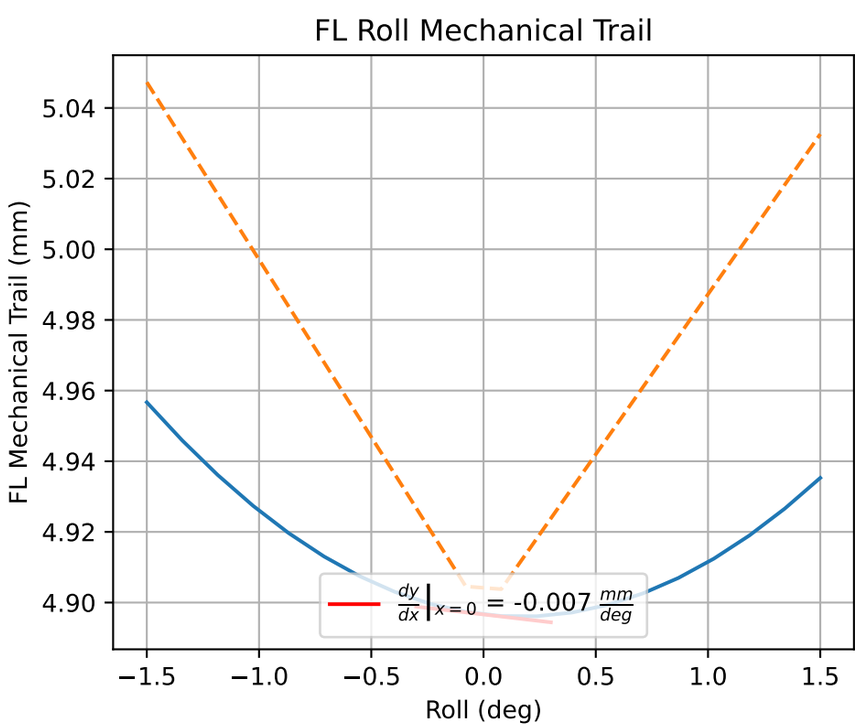
FL	$f(x) = 0.393x + 11.6$
FR	$f(x) = -0.393x + 11.6$
RL	$f(x) = 0.395x + 8.061$
RR	$f(x) = -0.395x + 8.061$

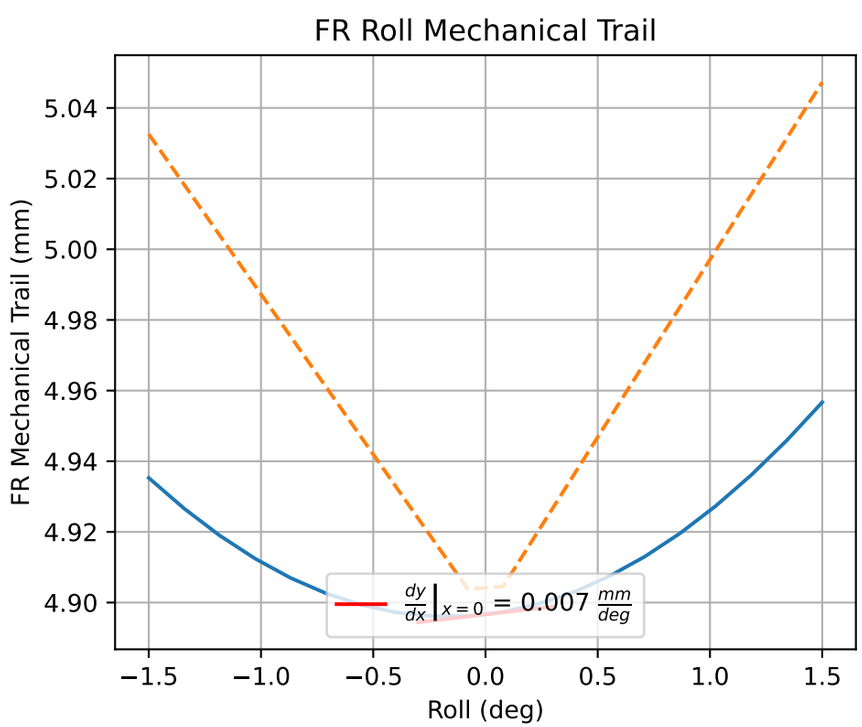


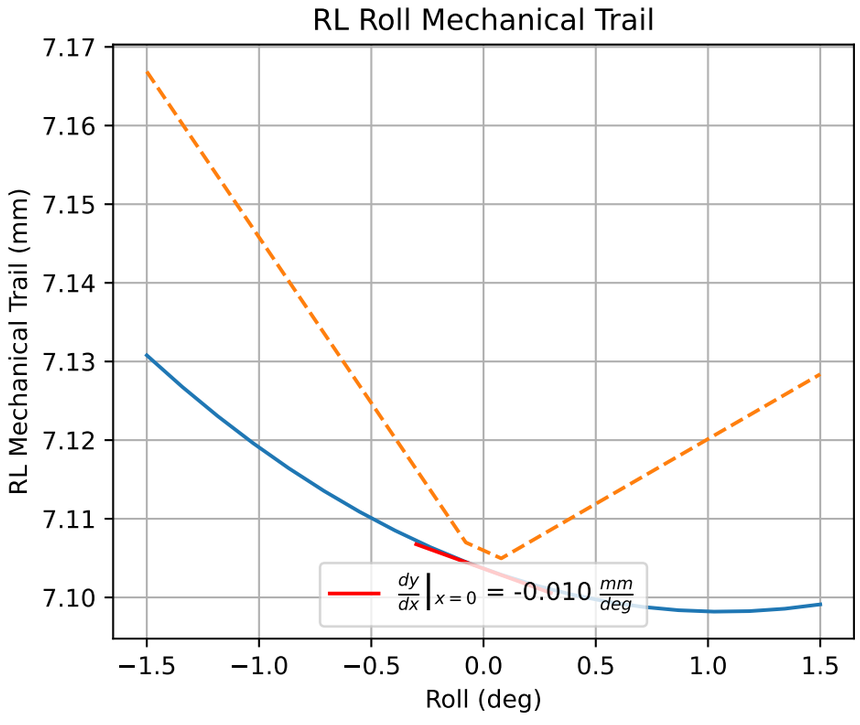


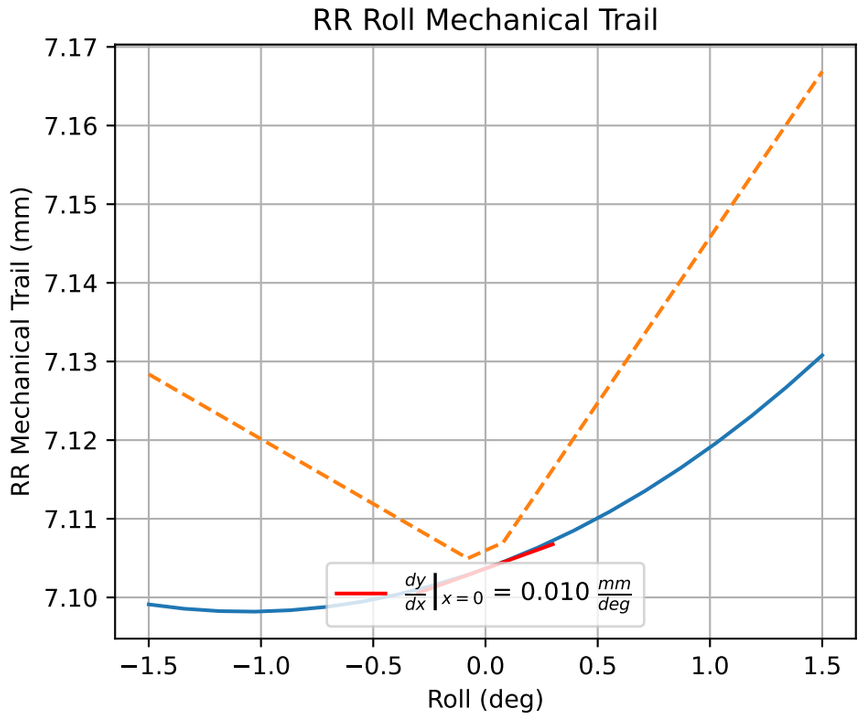
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.004x^2 + 0.393x + 11.6$
FR	$f(x) = -0.0x^3 + 0.004x^2 + -0.393x + 11.6$
RL	$f(x) = -0.0x^3 + 0.005x^2 + 0.395x + 8.061$
RR	$f(x) = 0.0x^3 + 0.005x^2 + -0.395x + 8.061$







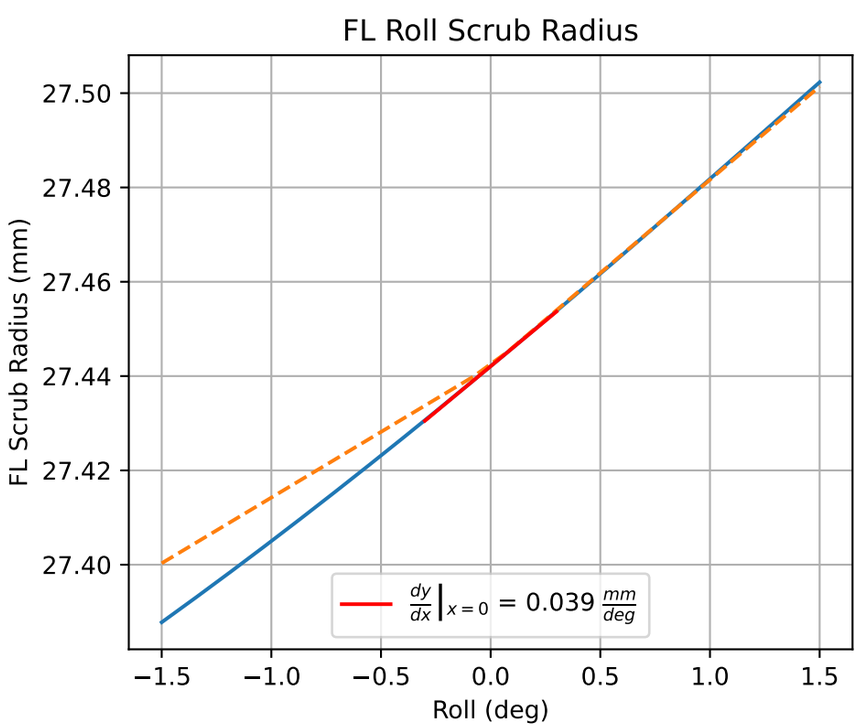


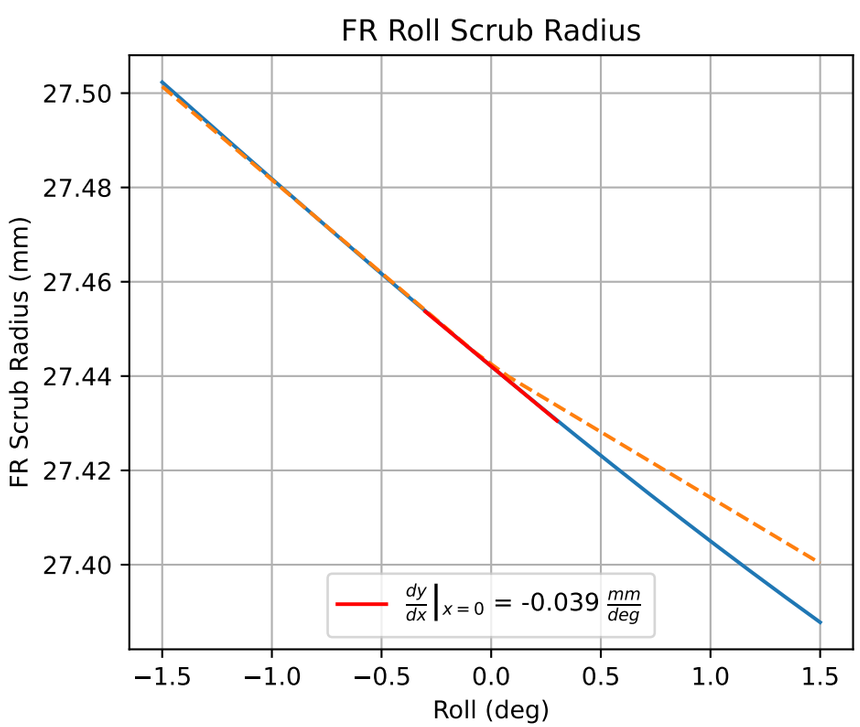
Linear Fit $f(x) = a_1x + a_0$

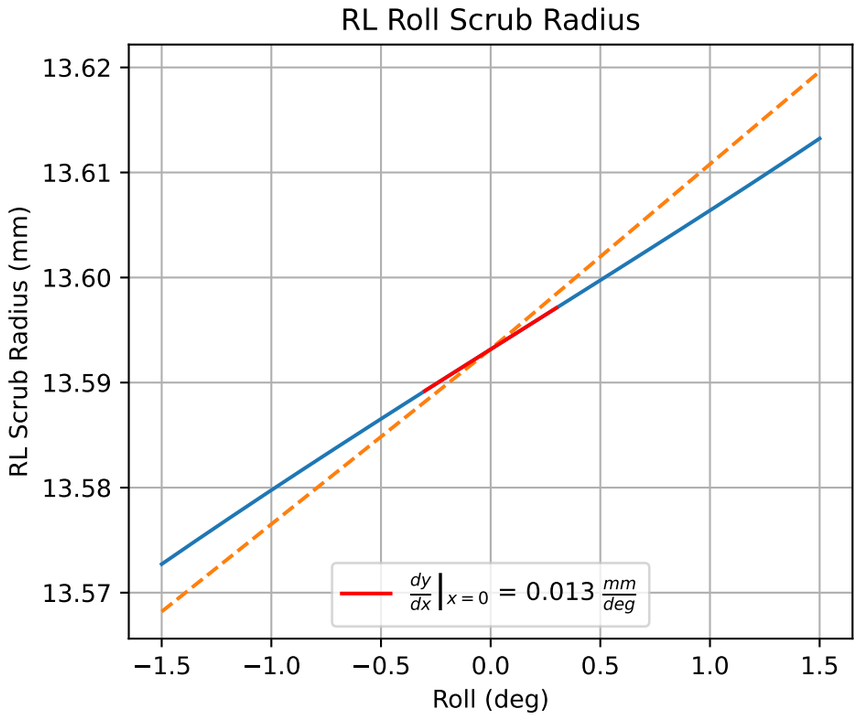
FL	$f(x) = -0.007x + 4.897$
FR	$f(x) = 0.007x + 4.897$
RL	$f(x) = -0.01x + 7.104$
RR	$f(x) = 0.01x + 7.104$

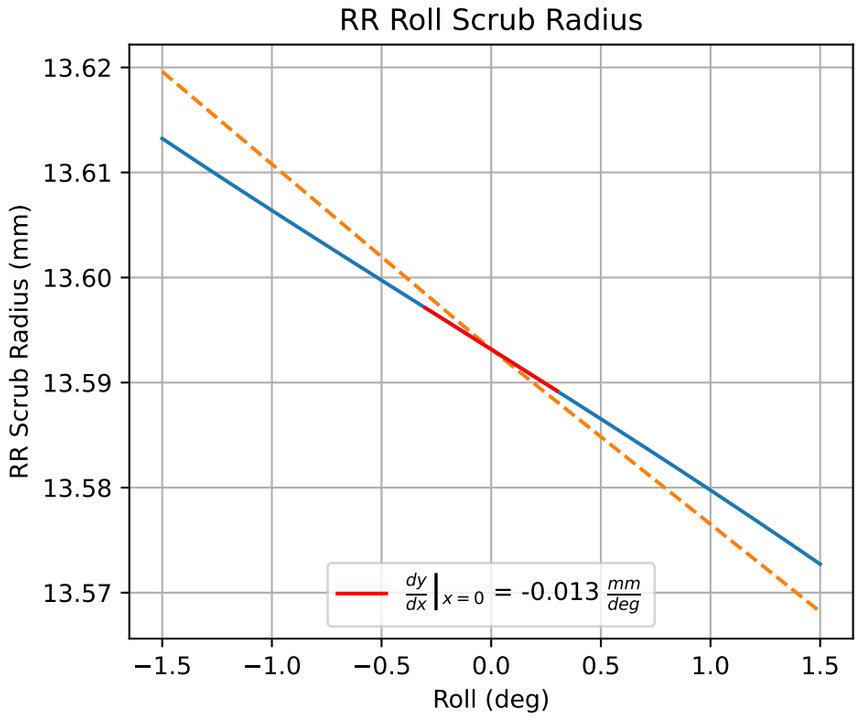
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.022x^2 + -0.007x + 4.897$
FR	$f(x) = -0.0x^3 + 0.022x^2 + 0.007x + 4.897$
RL	$f(x) = -0.0x^3 + 0.005x^2 + -0.01x + 7.104$
RR	$f(x) = 0.0x^3 + 0.005x^2 + 0.01x + 7.104$







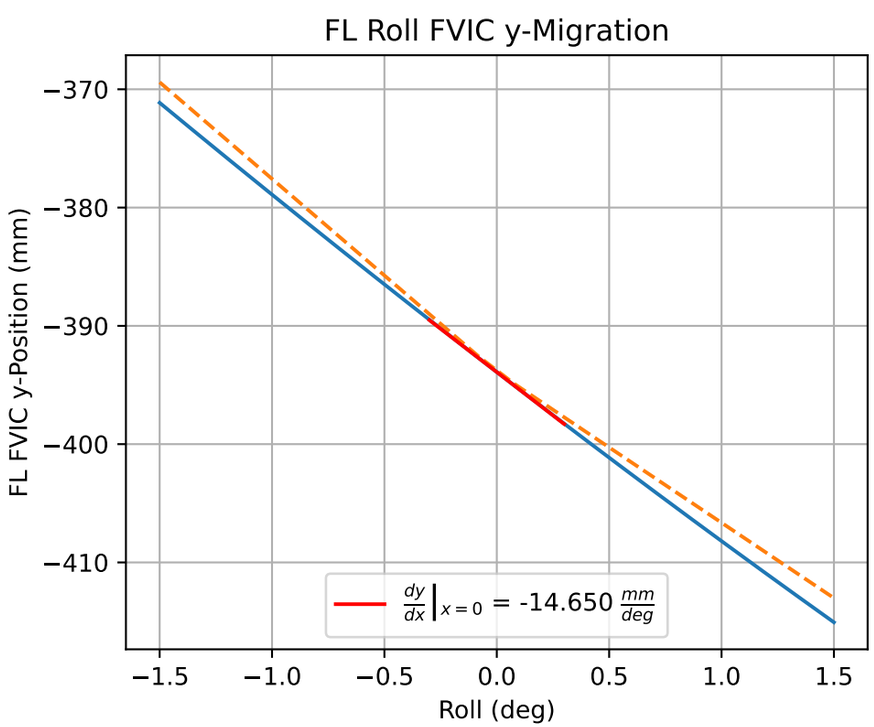


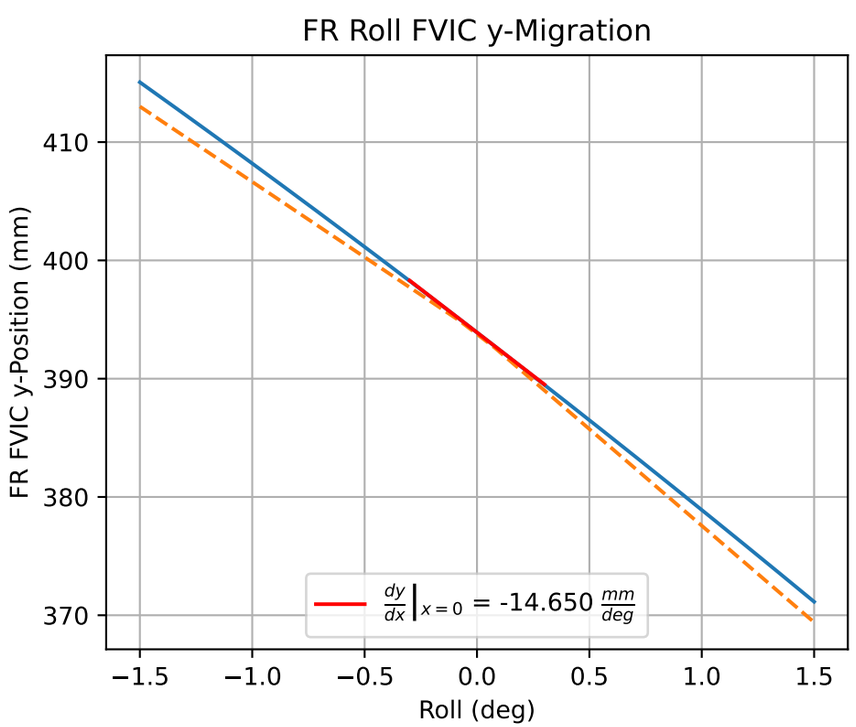
Linear Fit $f(x) = a_1x + a_0$

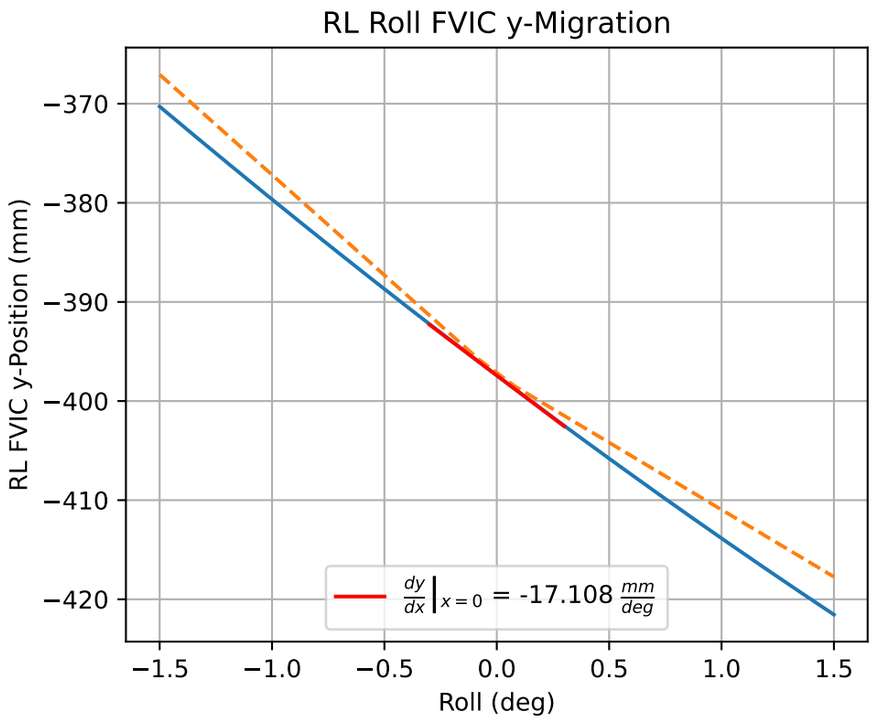
FL	$f(x) = 0.039x + 27.442$
FR	$f(x) = -0.039x + 27.442$
RL	$f(x) = 0.013x + 13.593$
RR	$f(x) = -0.013x + 13.593$

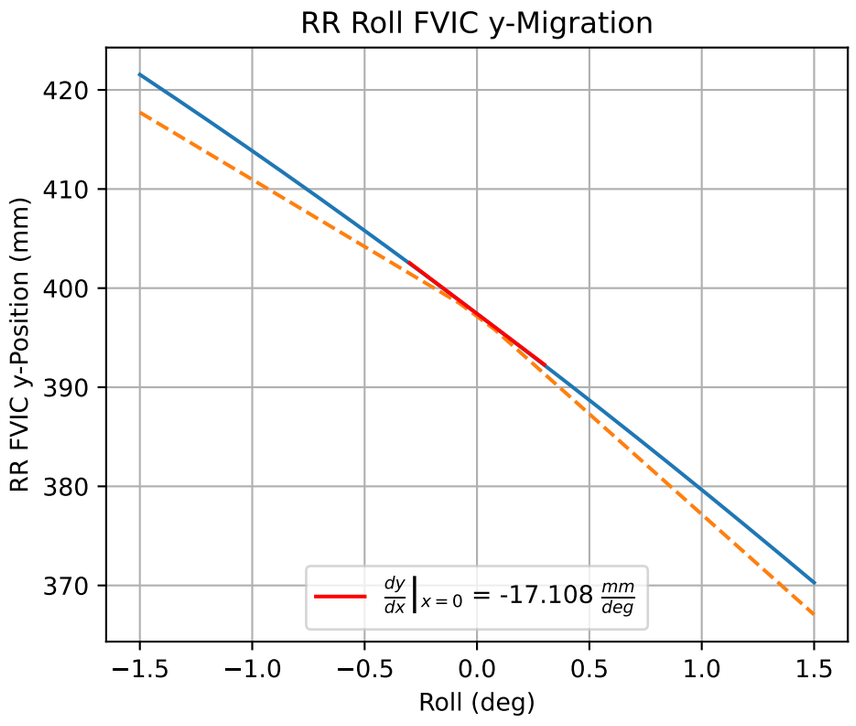
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.0x^3 + 0.001x^2 + 0.039x + 27.442$
FR	$f(x) = 0.0x^3 + 0.001x^2 + -0.039x + 27.442$
RL	$f(x) = 0.0x^3 + -0.0x^2 + 0.013x + 13.593$
RR	$f(x) = -0.0x^3 + -0.0x^2 + -0.013x + 13.593$







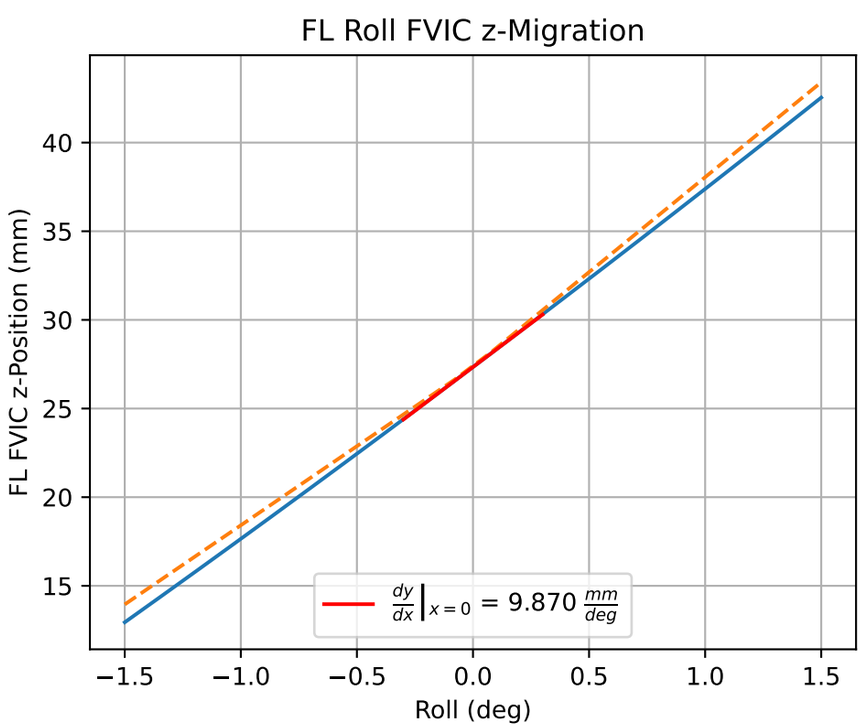


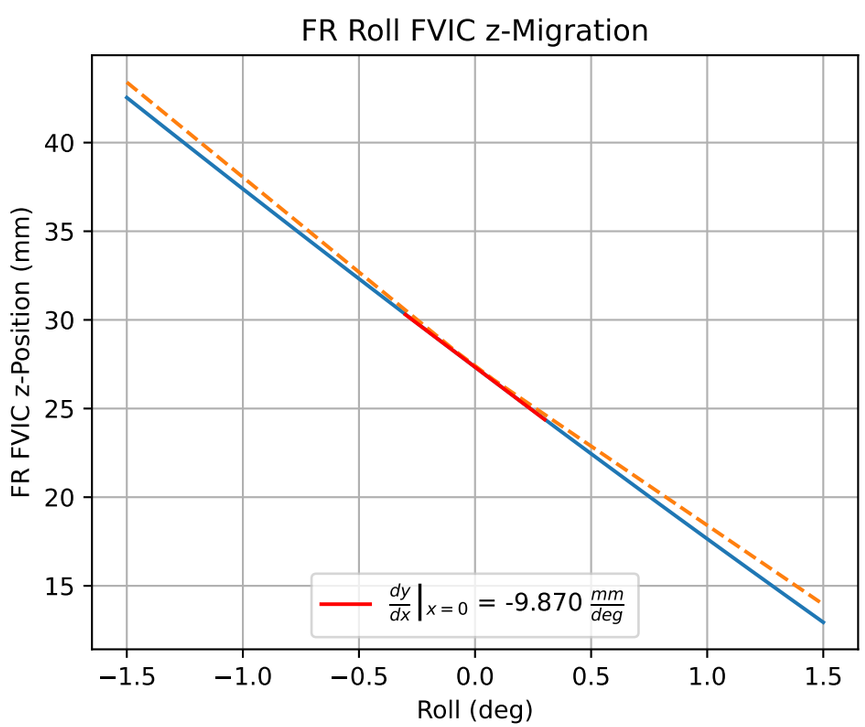
Linear Fit $f(x) = a_1x + a_0$

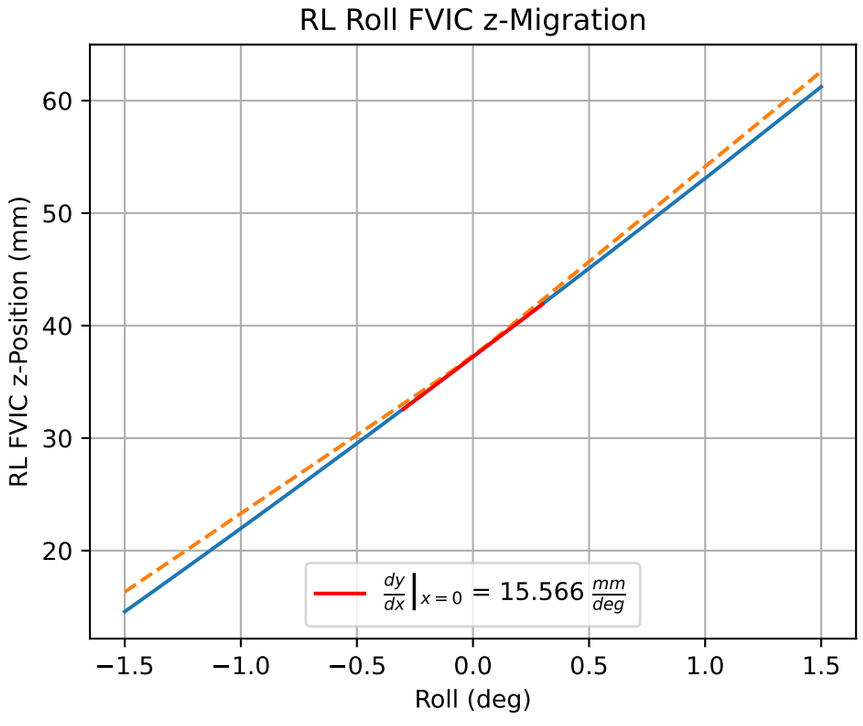
FL	$f(x) = -14.65x + -393.907$
FR	$f(x) = -14.65x + 393.907$
RL	$f(x) = -17.108x + -397.417$
RR	$f(x) = -17.108x + 397.417$

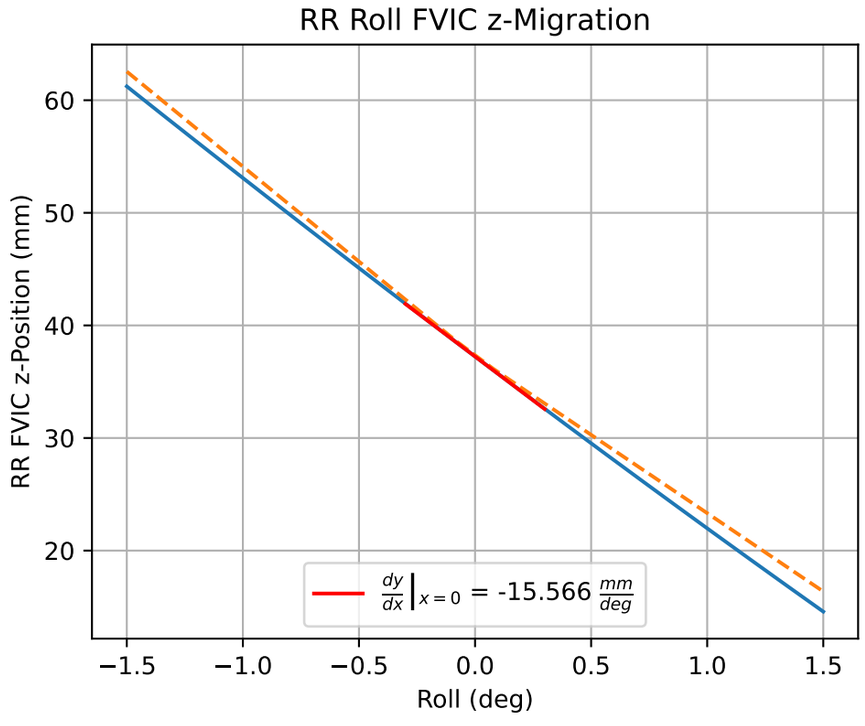
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.005x^3 + 0.358x^2 + -14.65x + -393.907$
FR	$f(x) = 0.005x^3 + -0.358x^2 + -14.65x + 393.907$
RL	$f(x) = 0.009x^3 + 0.667x^2 + -17.108x + -397.417$
RR	$f(x) = 0.009x^3 + -0.667x^2 + -17.108x + 397.417$







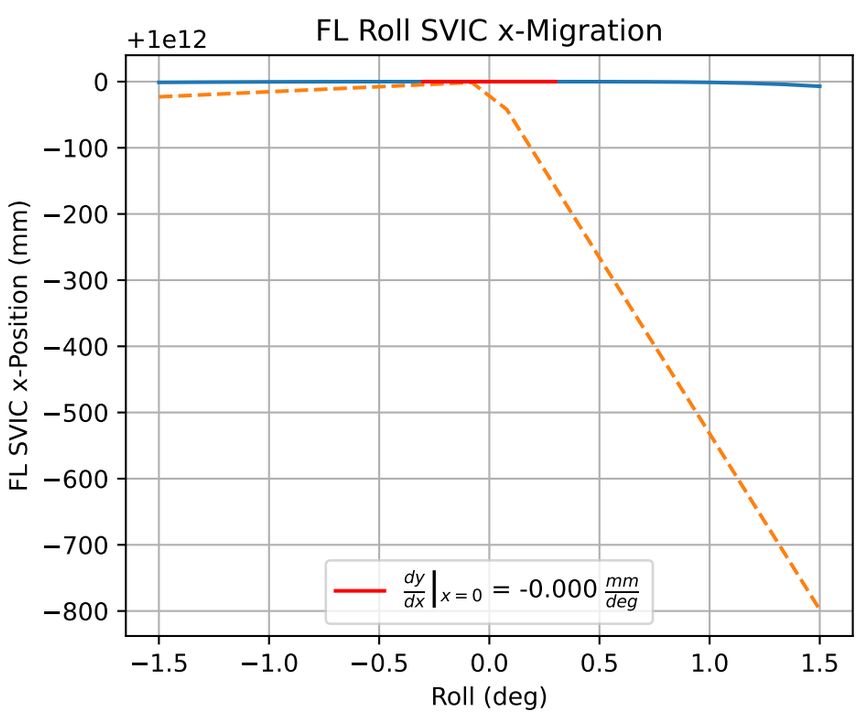


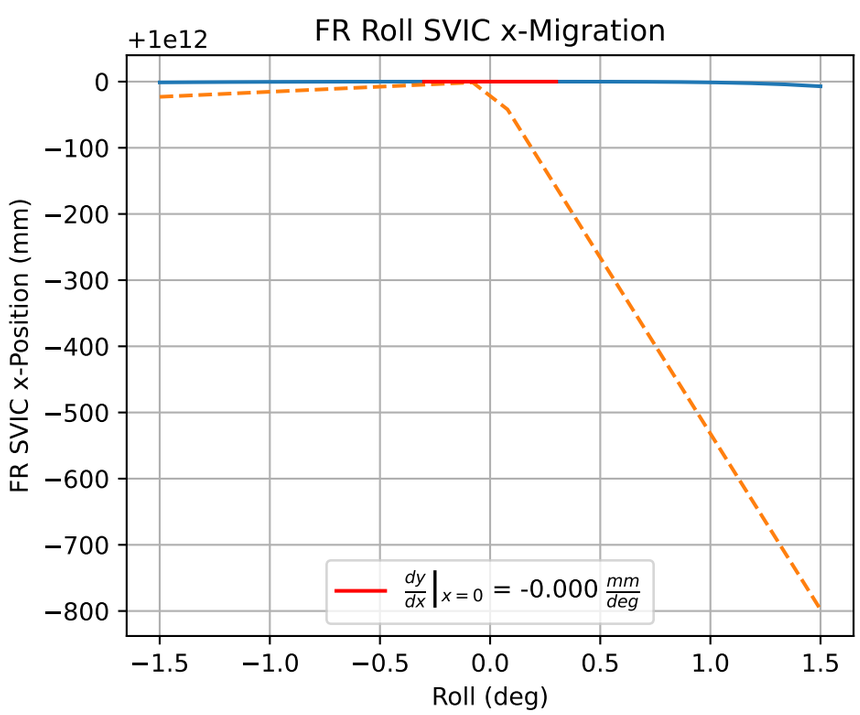
Linear Fit $f(x) = a_1x + a_0$

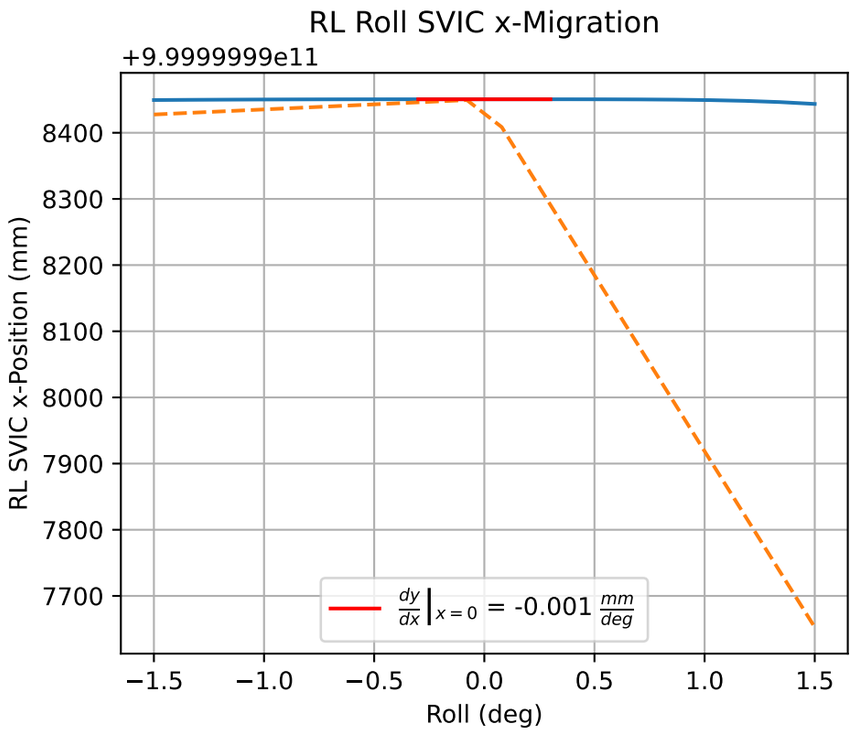
FL	$f(x) = 9.87x + 27.34$
FR	$f(x) = -9.87x + 27.34$
RL	$f(x) = 15.566x + 37.239$
RR	$f(x) = -15.566x + 37.239$

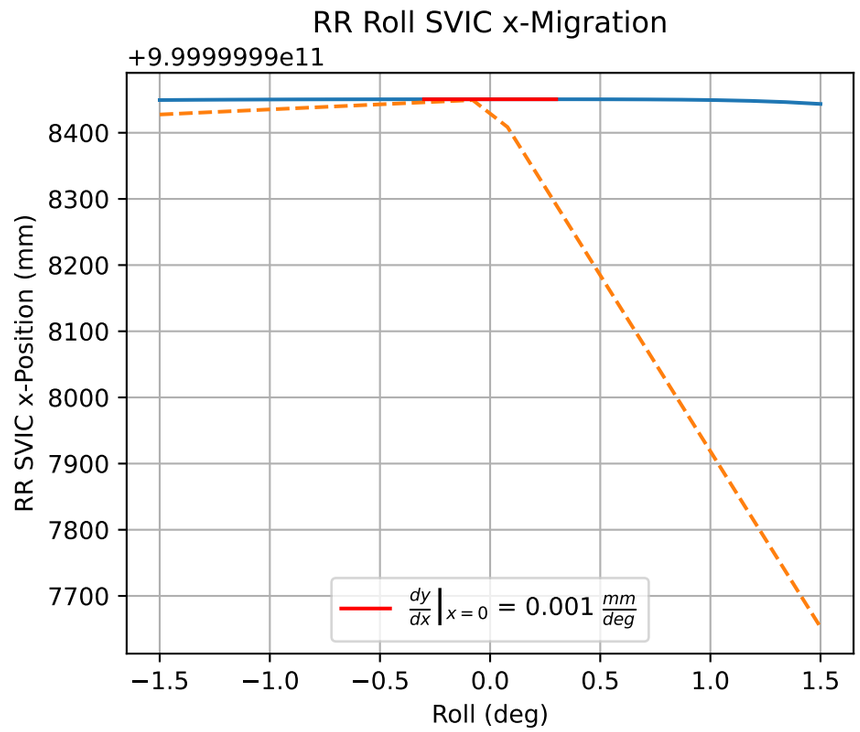
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -0.002x^3 + 0.178x^2 + 9.87x + 27.34$
FR	$f(x) = 0.002x^3 + 0.178x^2 + -9.87x + 27.34$
RL	$f(x) = -0.006x^3 + 0.296x^2 + 15.566x + 37.239$
RR	$f(x) = 0.007x^3 + 0.296x^2 + -15.566x + 37.239$







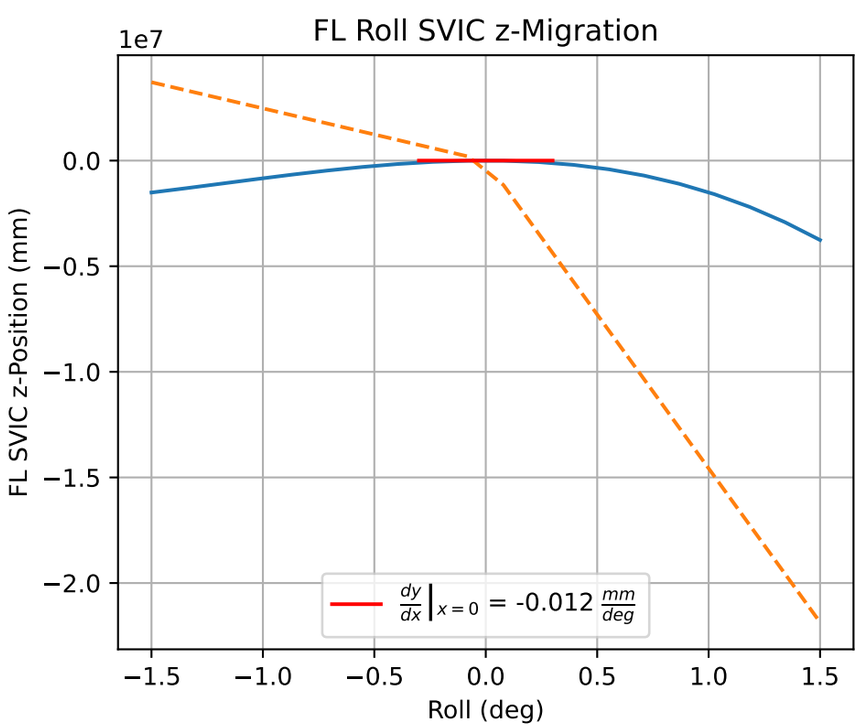


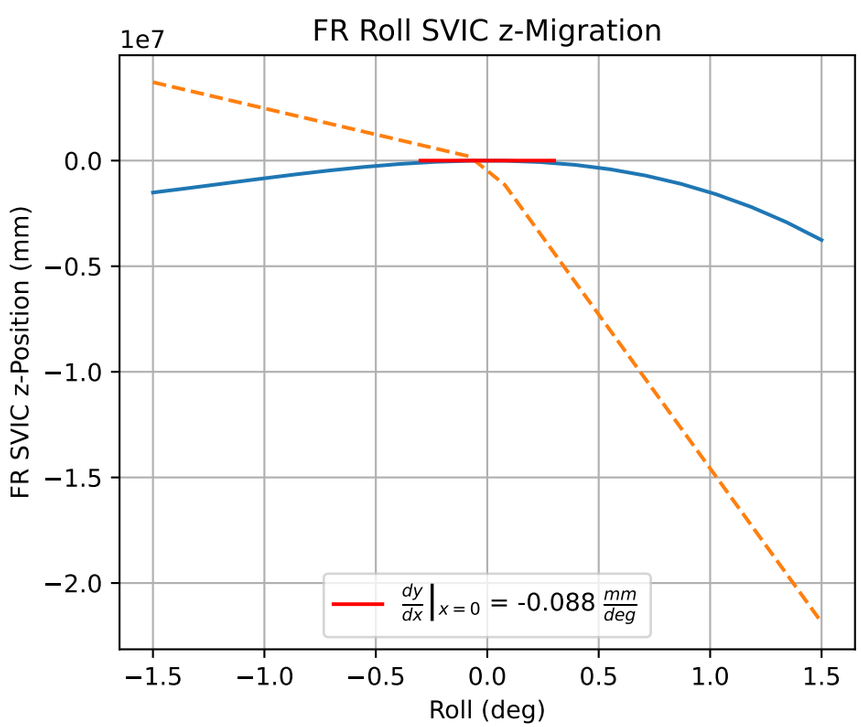
Linear Fit $f(x) = a_1x + a_0$

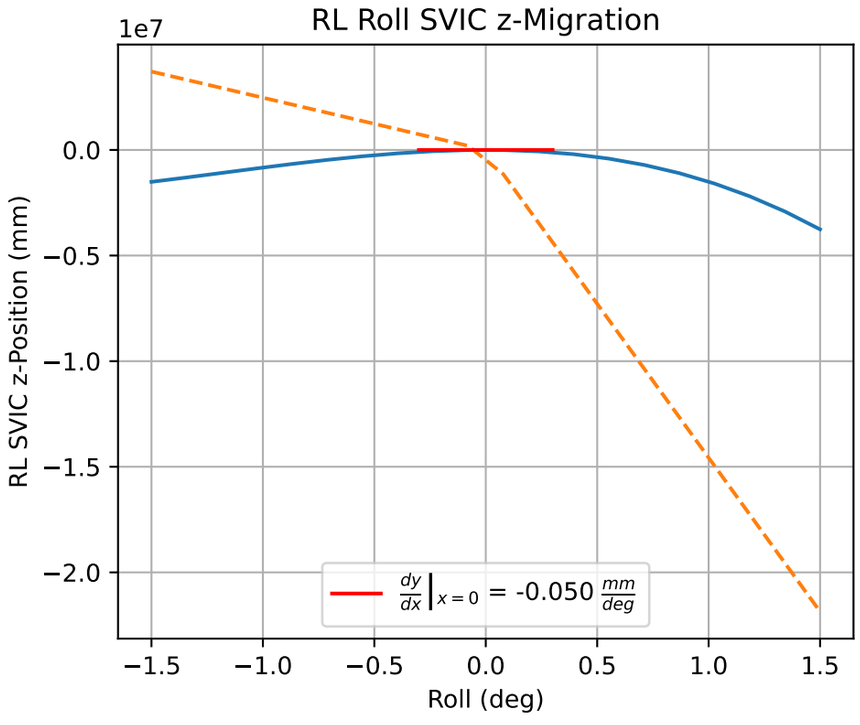
FL	$f(x) = -0.0x + 1.000e+12$
FR	$f(x) = -0.0x + 1.000e+12$
RL	$f(x) = -0.001x + 1.000e+12$
RR	$f(x) = 0.001x + 1.000e+12$

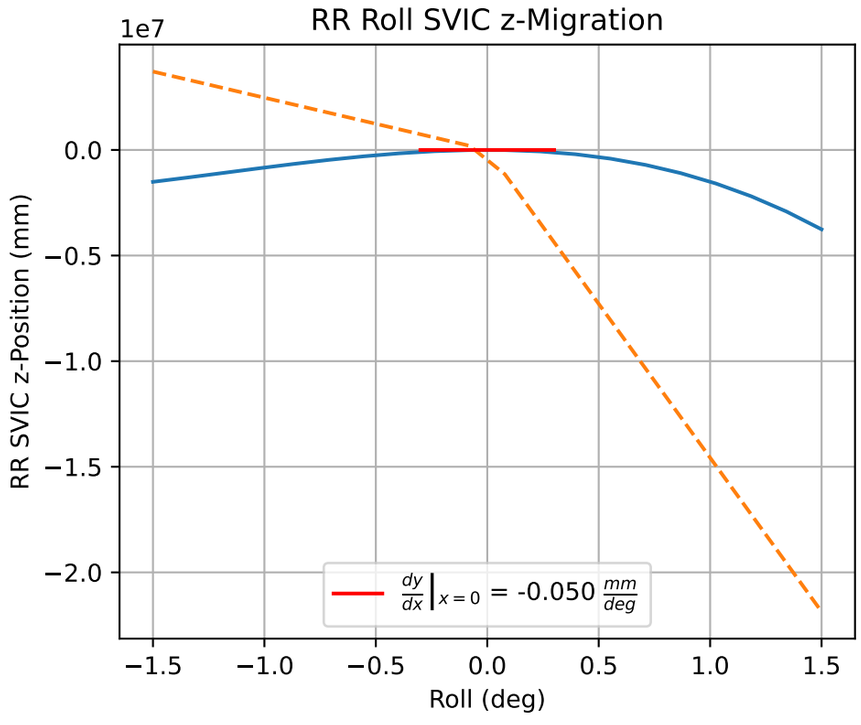
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = -1.062x^3 + -1.689x^2 + 0.555x + 1.0e+12$
FR	$f(x) = -1.062x^3 + -1.689x^2 + 0.555x + 1.0e+12$
RL	$f(x) = -1.062x^3 + -1.695x^2 + 0.555x + 1.0e+12$
RR	$f(x) = -1.062x^3 + -1.695x^2 + 0.556x + 1.0e+12$







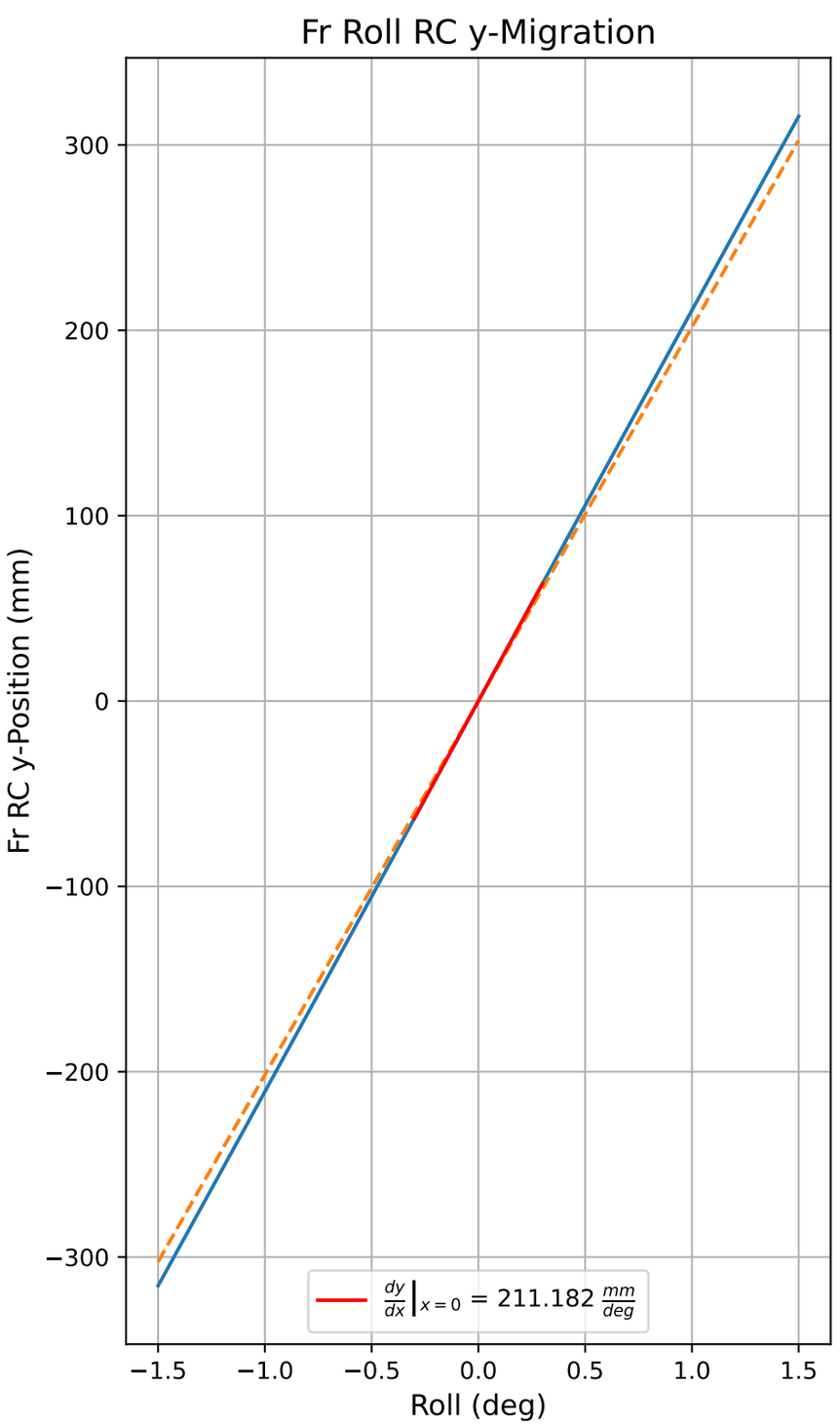


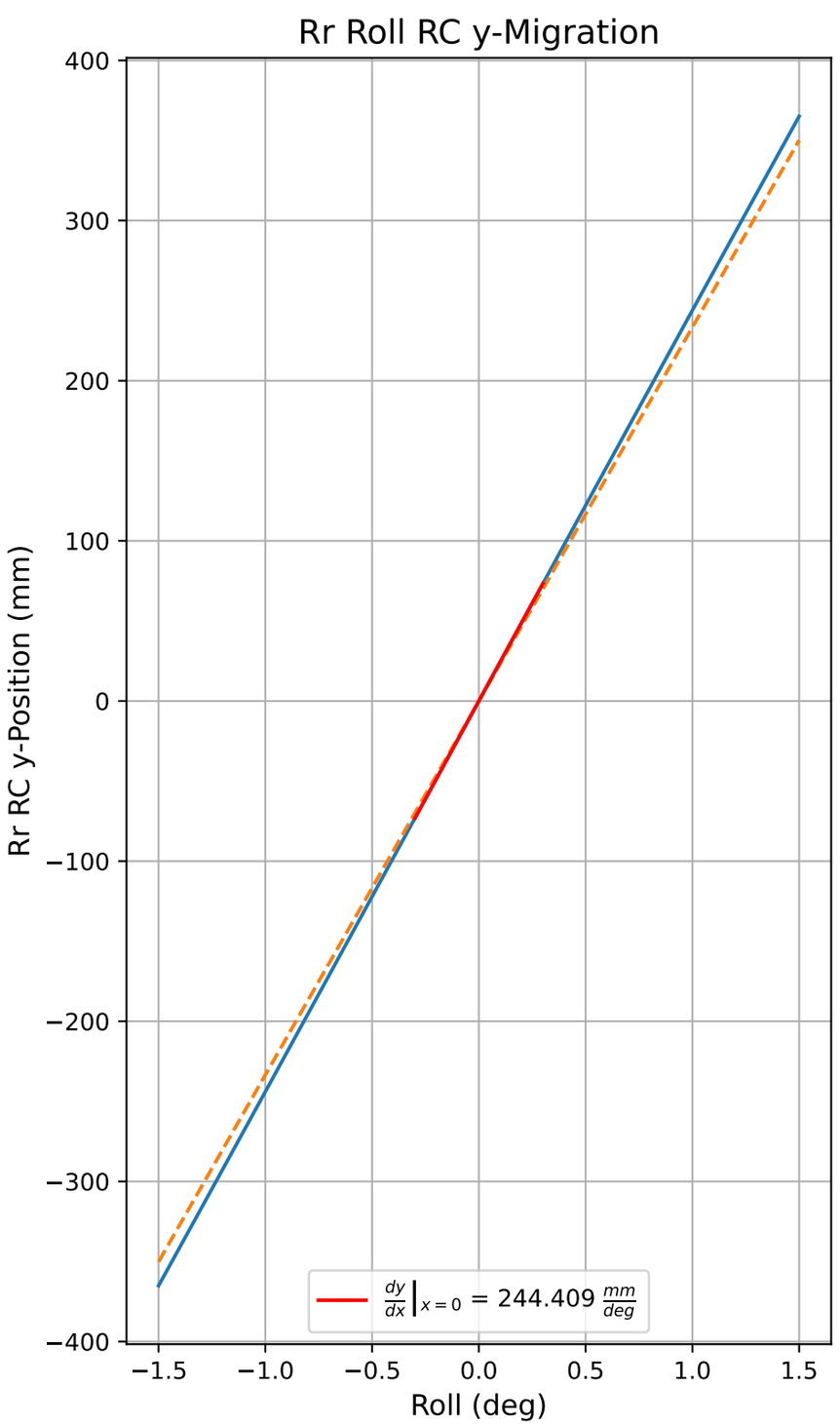
Linear Fit $f(x) = a_1x + a_0$

FL	$f(x) = -0.012x + 203.231$
FR	$f(x) = -0.088x + 203.231$
RL	$f(x) = -0.05x + 203.262$
RR	$f(x) = -0.05x + 203.262$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

$f(x)$ (FL)	$= -333350.204x^3 + -1171318.784x^2 + 473.537x + 1.0$
$f(x)$ (FR)	$= -333350.204x^3 + -1171318.784x^2 + 473.462x + 1.0$
$f(x)$ (RL)	$= -333350.204x^3 + -1171318.784x^2 + 473.499x + 1.0$
$f(x)$ (RR)	$= -333350.203x^3 + -1171318.784x^2 + 473.499x + 1.0$



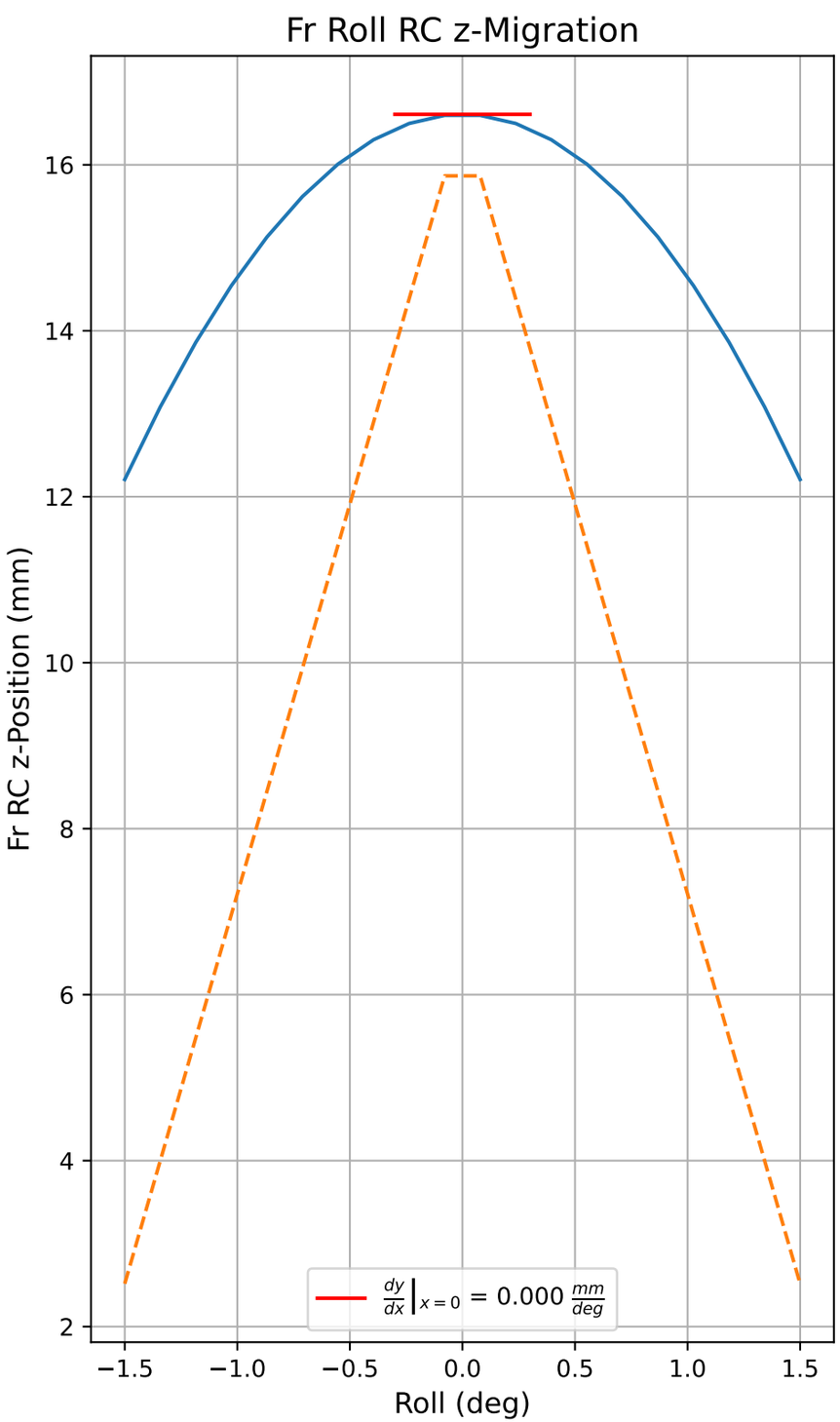


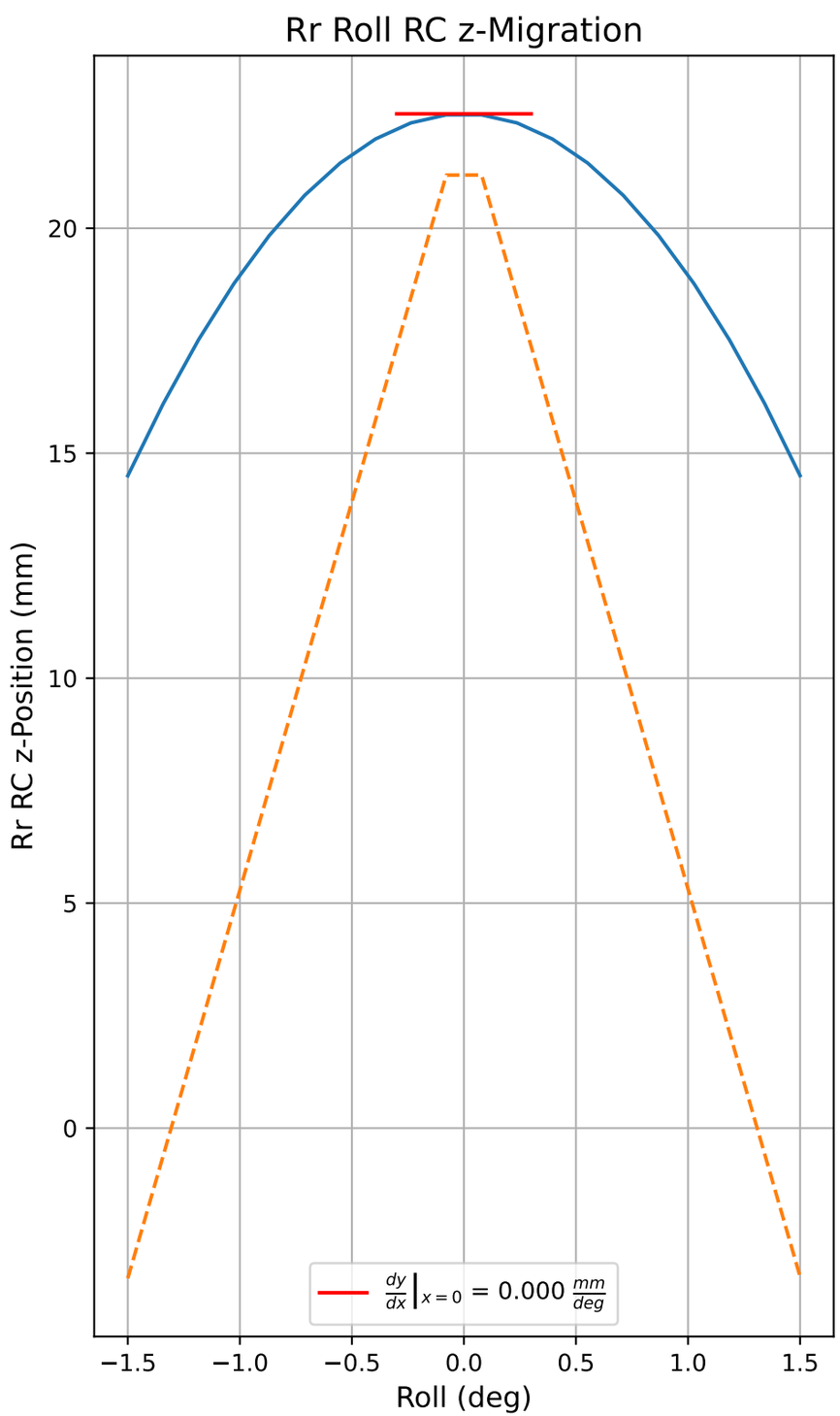
Linear Fit $f(x) = a_1x + a_0$

Fr	$f(x) = 211.182x + -0.0$
Rr	$f(x) = 244.409x + 0.0$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

Fr	$f(x) = -0.387x^3 + -0.0x^2 + 211.182x + 0.0$
Rr	$f(x) = -0.442x^3 + -0.0x^2 + 244.409x + 0.0$



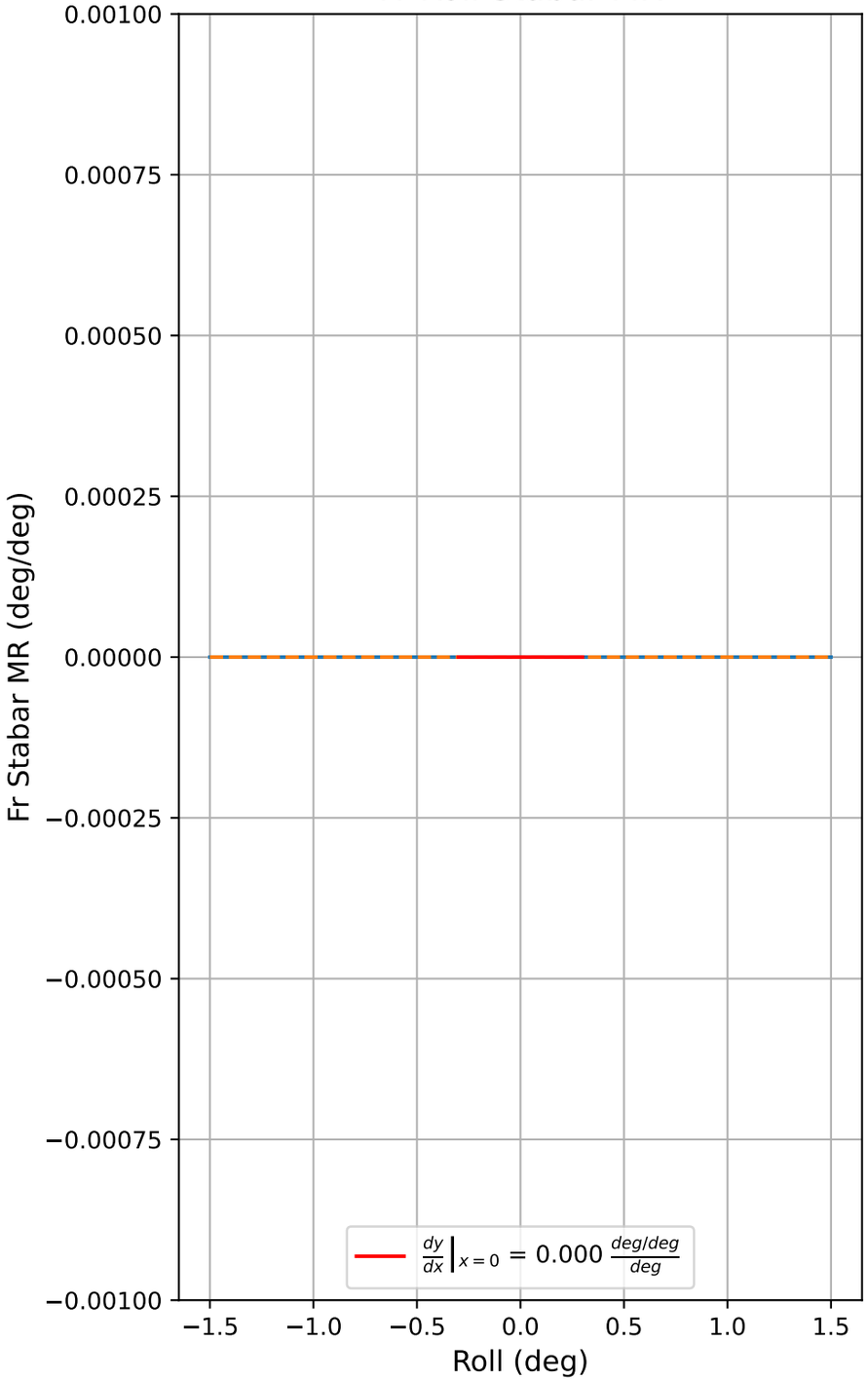


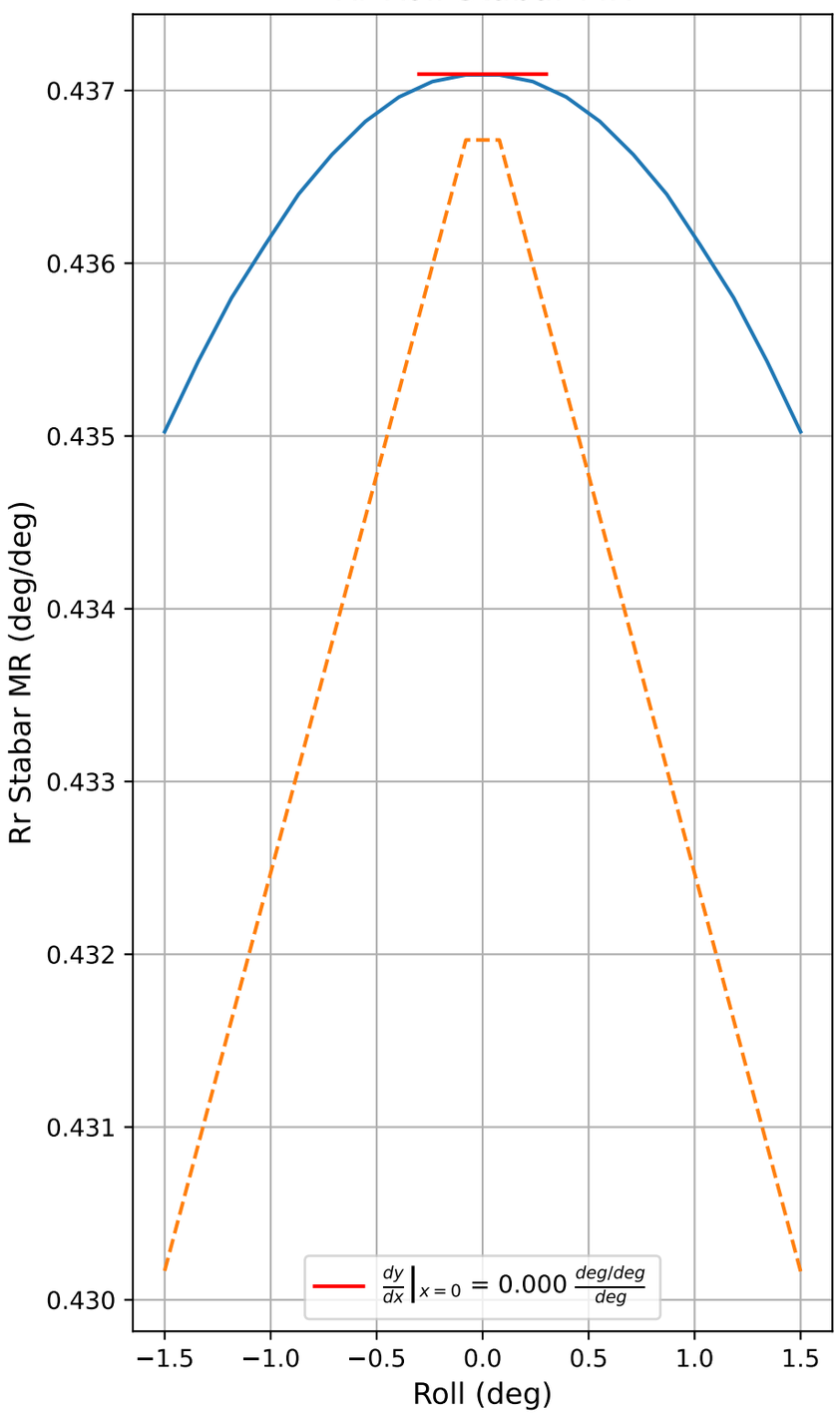
Linear Fit $f(x) = a_1x + a_0$

Fr	$f(x) = 0.0x + 16.608$
Rr	$f(x) = 0.0x + 22.543$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

Fr	$f(x) = 0.0x^3 + -1.956x^2 + -0.0x + 16.606$
Rr	$f(x) = 0.001x^3 + -3.575x^2 + -0.0x + 22.54$



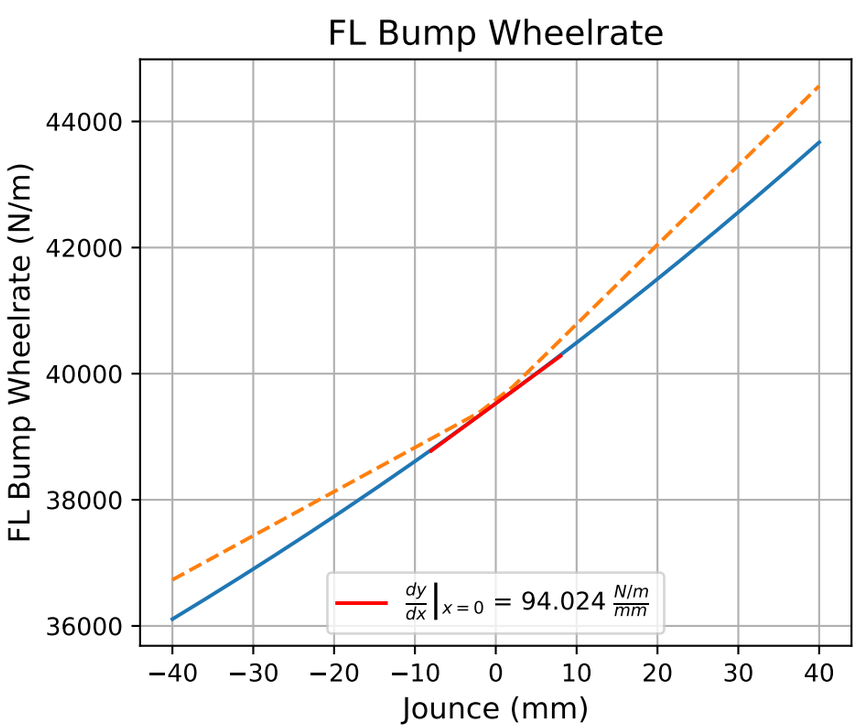


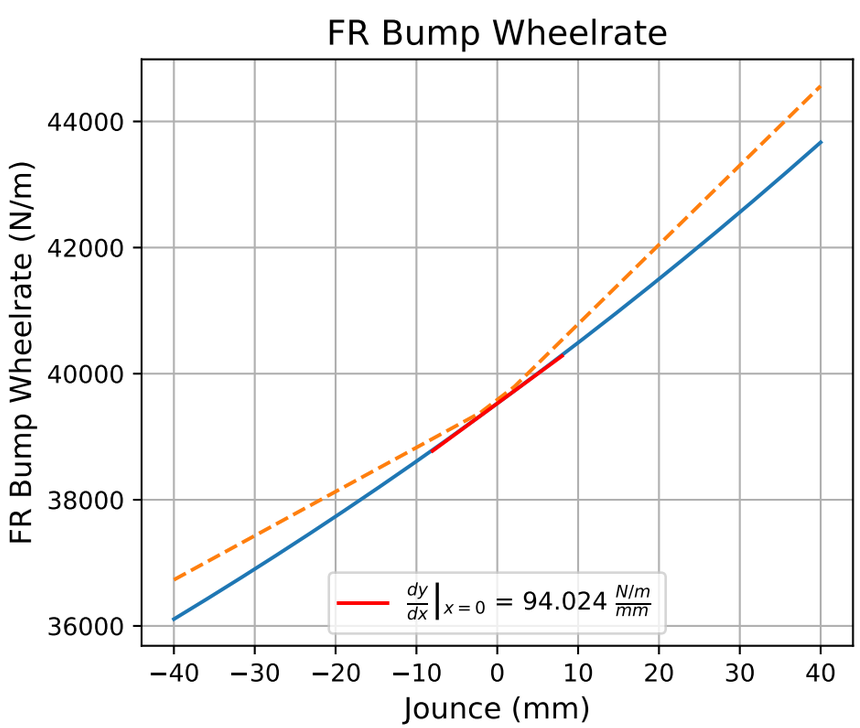
Linear Fit $f(x) = a_1x + a_0$

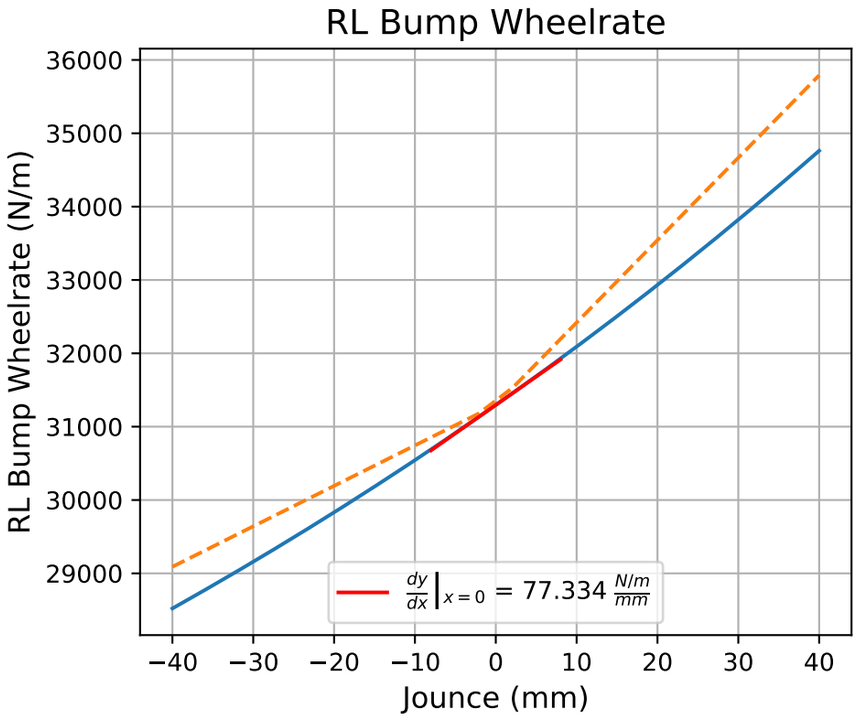
Fr	$f(x) = 0.0x + 0.0$
Rr	$f(x) = 0.0x + 0.437$

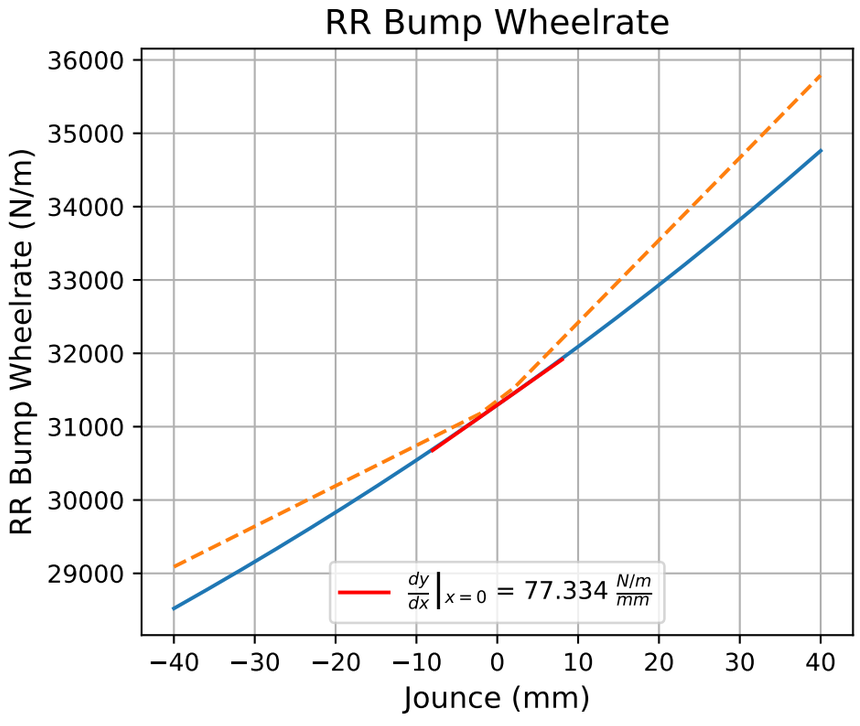
Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

Fr	$f(x) = 0.0x^3 + 0.0x^2 + 0.0x + 0.0$
Rr	$f(x) = 0.0x^3 + -0.001x^2 + -0.0x + 0.437$









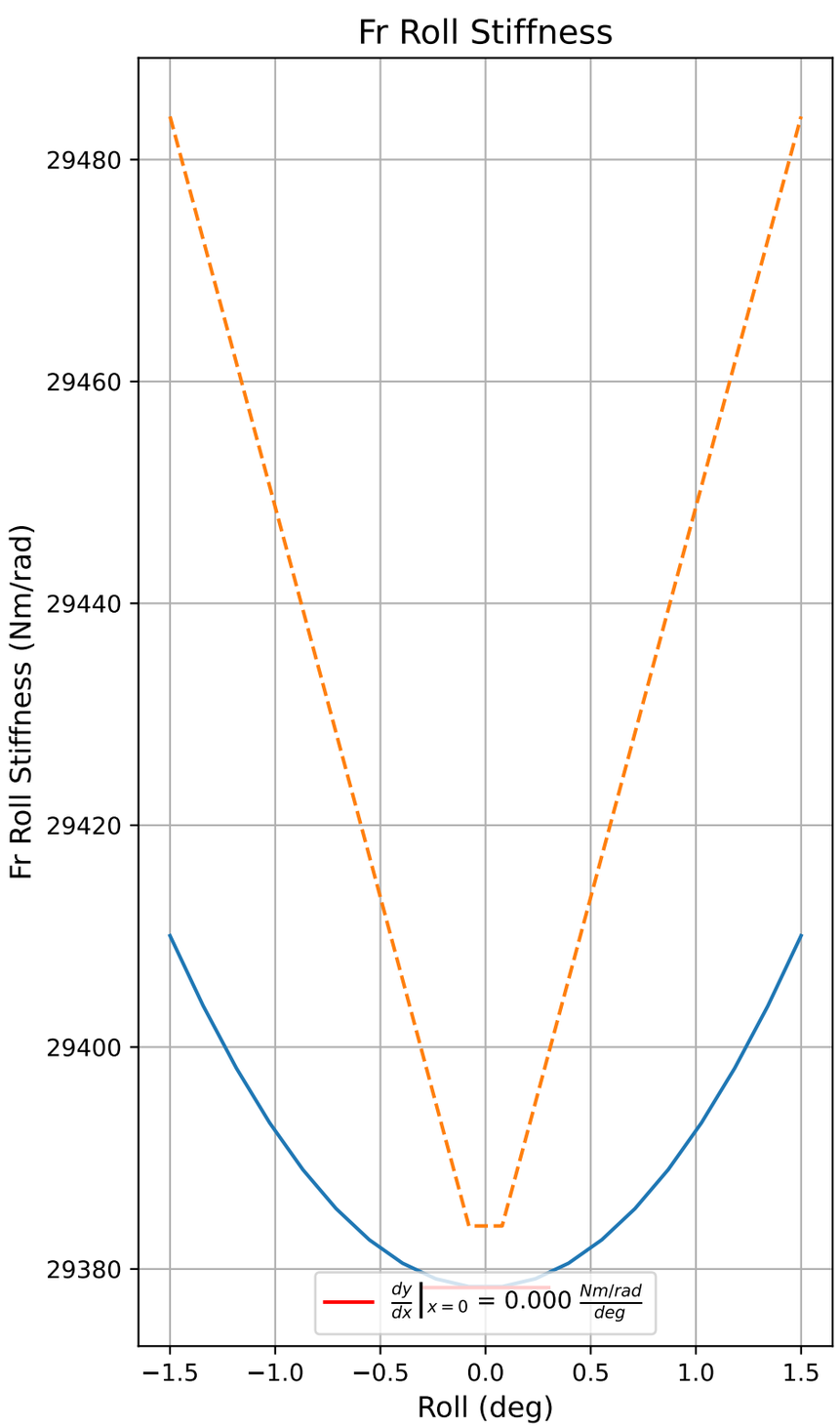
Full Model
FMU

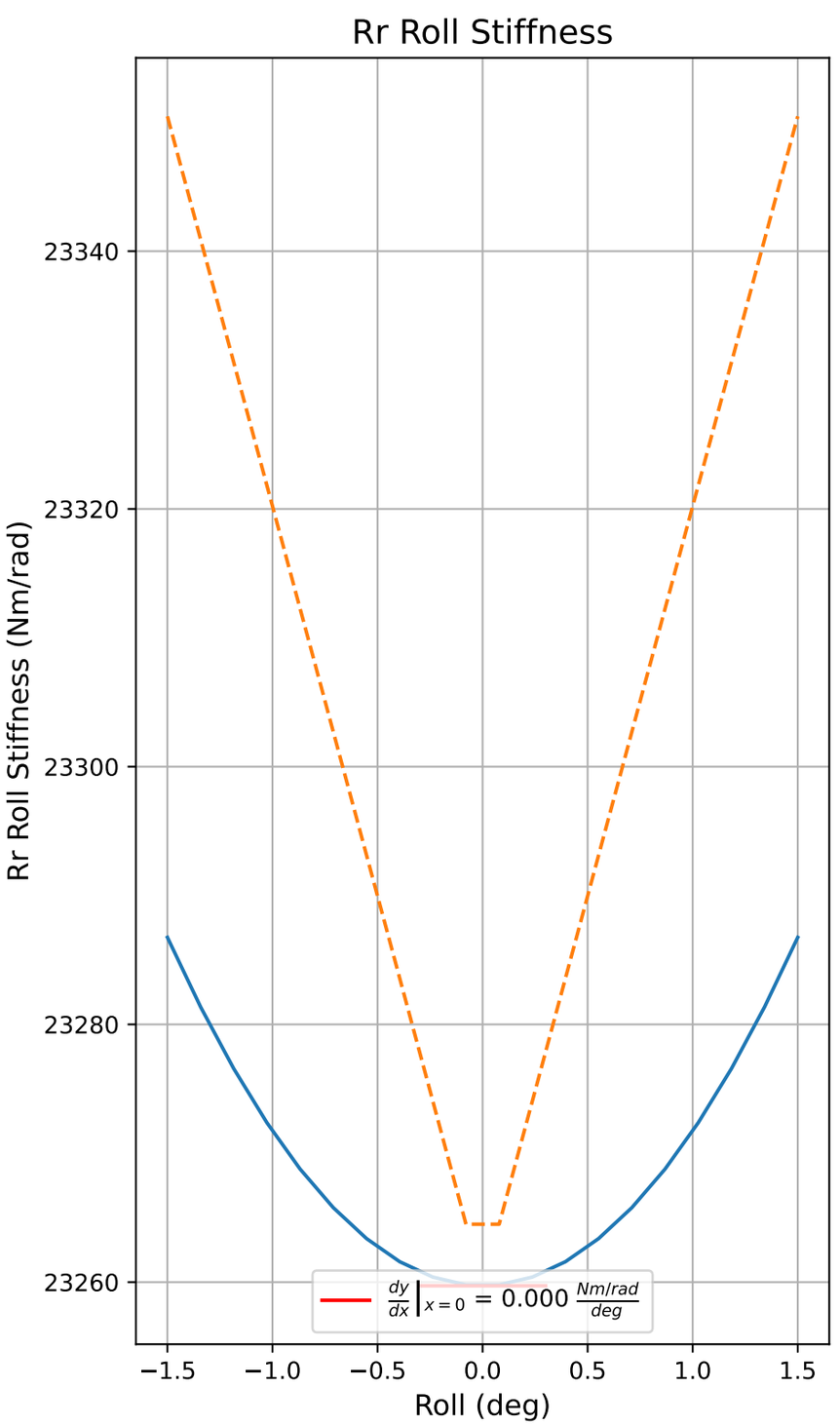
Linear Fit $f(x) = a_1x + a_0$

FL	$f(x) = 94.024x + 3.953e+04$
FR	$f(x) = 94.024x + 3.953e+04$
RL	$f(x) = 77.334x + 3.130e+04$
RR	$f(x) = 77.334x + 3.130e+04$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

FL	$f(x) = 0.0x^3 + 0.225x^2 + 94.027x + 4.0e+04$
FR	$f(x) = 0.0x^3 + 0.225x^2 + 94.027x + 4.0e+04$
RL	$f(x) = 0.0x^3 + 0.216x^2 + 77.334x + 3.1e+04$
RR	$f(x) = 0.0x^3 + 0.216x^2 + 77.334x + 3.1e+04$





Linear Fit $f(x) = a_1x + a_0$

Fr	$f(x) = 0.0x + 29378.323$
Rr	$f(x) = 0.0x + 23259.717$

Cubic Fit $f(x) = a_3x^3 + a_2x^2 + a_1x + a_0$

Fr	$f(x) = 0.0x^3 + 14.096x^2 + -0.0x + 29378.323$
Rr	$f(x) = -0.0x^3 + 12.015x^2 + -0.0x + 23259.715$