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July 14, 2016

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Chapter 1

Introduction

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1.1 System Description

The properties of the bodies are given in Tables 1.1 and 1.2. The properties of the connecctions are given in Tables 1.3, 1.4, and 1.5.

Table 1.1: Body CG Locations and Mass

No.	Body Name	Location [m]	Mass [kg]
1	frame	0.300, 0.000, −0.900	85.000
2	fork	0.900, 0.000, −0.700	4.000
3	front-wheel	1.020, 0.000, −0.350	3.000
4	rear-wheel	0.000, 0.000, −0.300	2.000

Table 1.2: Body Inertia Properties

No.	Body Name	Inertia [kg·m^2] (I_{xx}, I_{yy}, I_{zz}; I_{xy}, I_{yz}, I_{zx})
1	frame	9.200, 11.000, 2.800; 0.000, 0.000, −2.400
2	fork	0.059, 0.060, 0.007; 0.000, 0.000, 0.008
3	front-wheel	0.141, 0.280, 0.141; 0.000, 0.000, 0.000
4	rear-wheel	0.060, 0.120, 0.060; 0.000, 0.000, 0.000

Note: inertias are defined as the positive integral over the body, e.g., $I_{xy} = +\int r_x r_y \, dm$.

Table 1.3: Connection Location and Direction

No.	Connection Name	Location [m]	Unit Axis
1	head	0.853, 0.000, −0.761	0.309, 0.000, 0.951
2	rear axle	0.000, 0.000, −0.300	0.000, 1.000, 0.000
3	front axle	1.020, 0.000, −0.350	0.000, 1.000, 0.000
4	rear road	0.000, 0.000, 0.000	0.000, 1.000, 0.000
5	front road	1.020, 0.000, 0.000	0.000, 1.000, 0.000
6	speed	0.300, 0.000, −0.900	1.000, 0.000, 0.000
7	front tire	1.020, 0.000, 0.000	0.000, 1.000, 0.000
8	rear tire	0.000, 0.000, 0.000	0.000, 1.000, 0.000

Table 1.4: Connection Locations

No.	Connection Name	Location [m]	Location [m]

Table 1.5: Connection Properties

No.	Connection Name	Stiffness [N/m]	Damping [Ns/m]

Chapter 2

Analysis

Replace this text with the body of your report. Add sections or subsections as appropriate.

2.1 Eigenvalue Plot

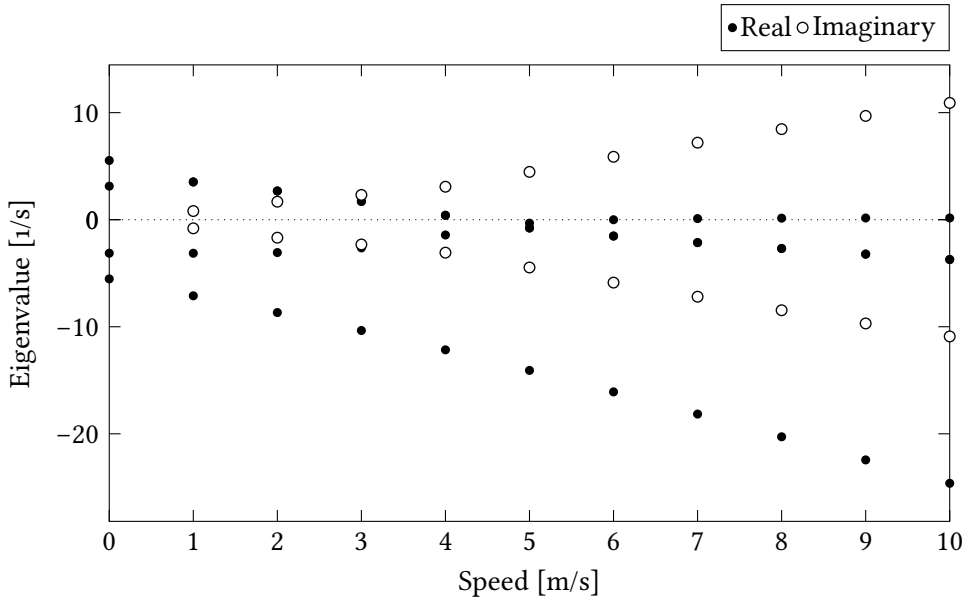

Figure 2.1: Eigenvalues vs. Speed

2.2 Frequency Response Plots

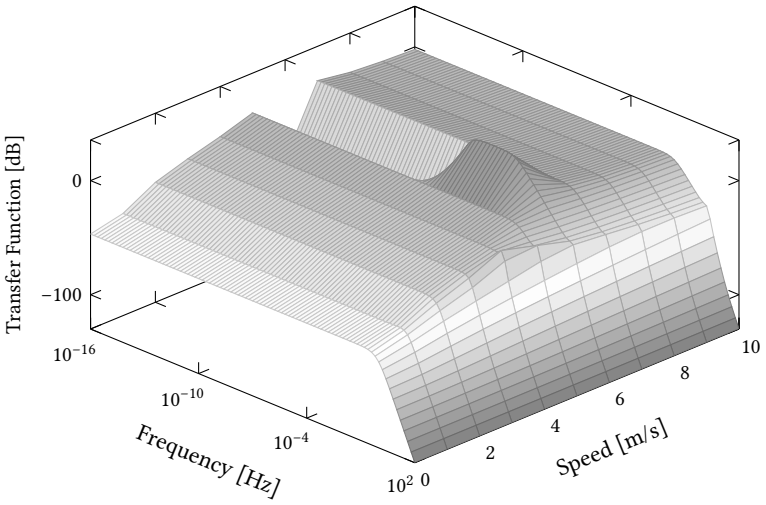

Figure 2.2: Frequency response: ϕ/m_δ

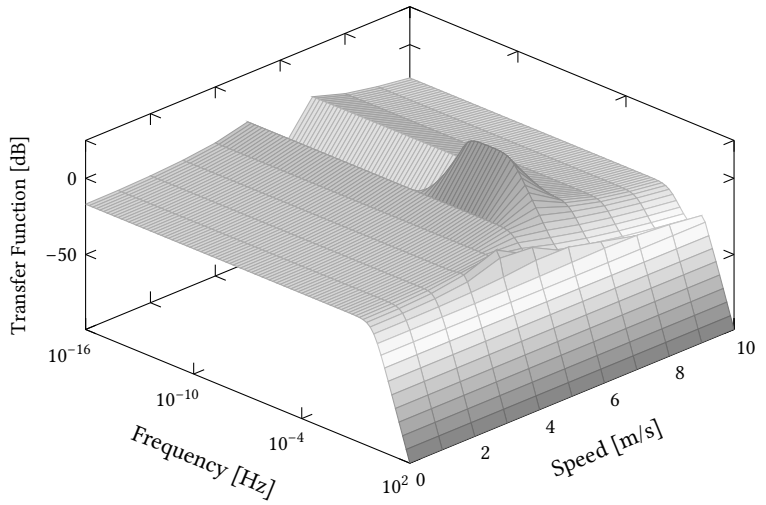

Figure 2.3: Frequency response: δ/m_δ

2.3 Steady State Transfer Functions Plot

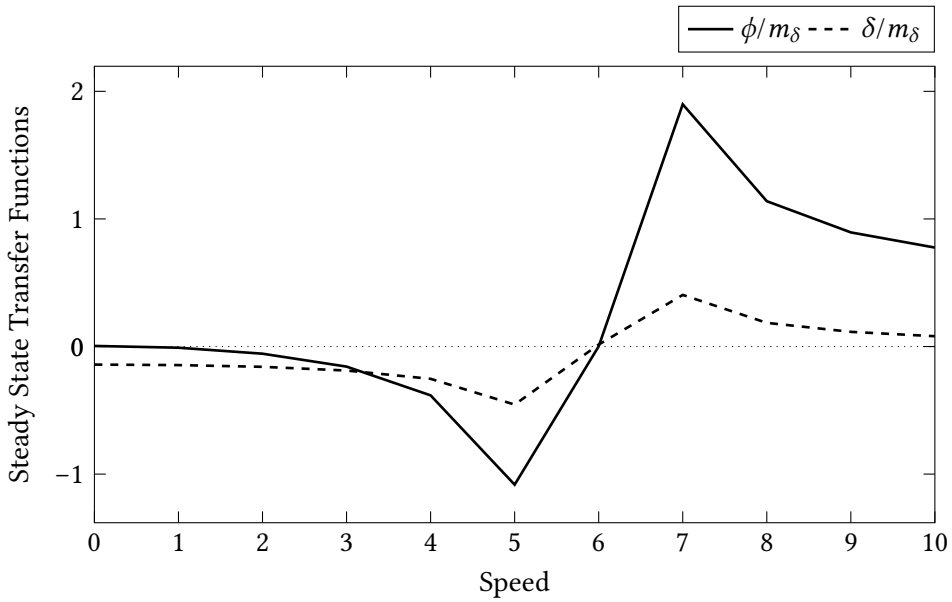

Figure 2.4: Steady State Transfer Functions

2.4 Hankel Singular Values Plot

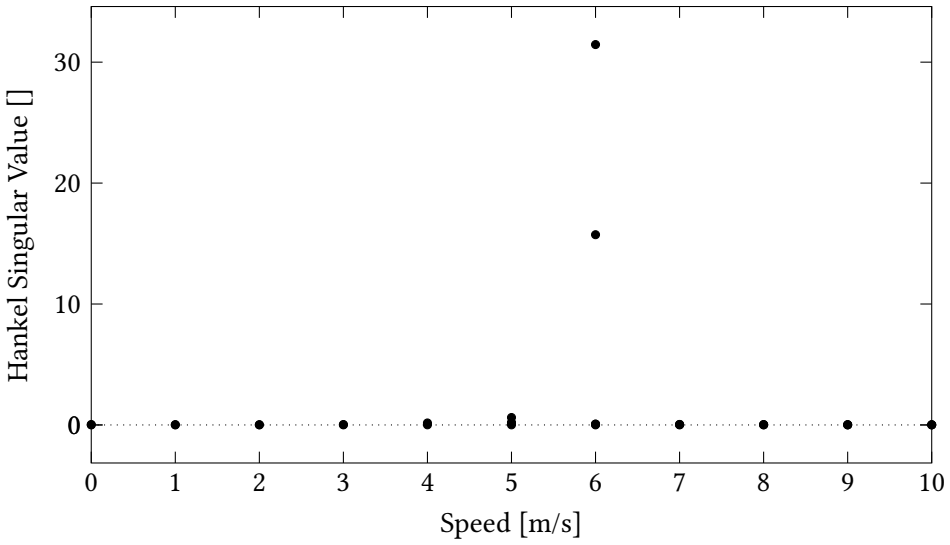

Figure 2.5: Hankel Singular Values vs. Speed

2.5 Equilibrium Analysis

The results of the equlibrium load analysis are given in Tables 2.1 and 2.2.

Table 2.1: System Static Deflections

No.	Body Name	Type	Deflection [m] or [rad]
1	frame	translation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
–	–	rotation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
2	fork	translation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
–	–	rotation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
3	front-wheel	translation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
–	–	rotation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
4	rear-wheel	translation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}
–	–	rotation	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}

Table 2.2: System Preloads

No.	Connector Name	Type	Load [N] or [Nm] (Components; Magnitude)
1	head	force	0.0000×10^{0}, 0.0000×10^{0}, -2.4063×10^{2}; 2.4063×10^{2}
–	–	moment	0.0000×10^{0}, 4.4946×10^{1}, 0.0000×10^{0}; 4.4946×10^{1}
2	rear axle	force	0.0000×10^{0}, 0.0000×10^{0}, -5.9322×10^{2}; 5.9322×10^{2}
3	front axle	force	0.0000×10^{0}, 0.0000×10^{0}, -2.7987×10^{2}; 2.7987×10^{2}
4	rear road	force	0.0000×10^{0}, 0.0000×10^{0}, -6.1284×10^{2}; 6.1284×10^{2}
5	front road	force	0.0000×10^{0}, 0.0000×10^{0}, -3.0930×10^{2}; 3.0930×10^{2}
6	speed	force	0.0000×10^{0}, 0.0000×10^{0}, 0.0000×10^{0}; 0.0000×10^{0}

Chapter 3

Conclusion

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Appendix A

Equations of Motion