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APPENDICES

APPENDIX A

PRINCIPAL FREQUENCY WEIGHTINGS IN ONE-THIRD OCTAVES

Frequency band number x	Frequency f Hz	W_k		W_d		W_f	
		factor X 1000	dB	factor X 1000	dB	factor X 1000	dB
-17	0.02					24.2	-32.33
-16	0.025					37.7	-28.48
-15	0.0315					59.7	-24.47
-14	0.04					97.1	-20.25
-13	0.05					157	-16.10
-12	0.063					267	-11.49
-11	0.08					461	-6.73
-10	0.1	31.2	-30.11	62.4	-24.09	695	-3.16
-9	0.125	48.6	-26.26	97.3	-20.24	895	-0.96
-8	0.16	79.0	-22.05	158	-16.01	1006	0.05
-7	0.2	121	-18.33	243	-12.28	992	-0.07
-6	0.25	182	-14.81	365	-8.75	854	-1.37
-5	0.315	263	-11.60	530	-5.52	619	-4.17
-4	0.4	352	-9.07	713	-2.94	384	-8.31
-3	0.5	418	-7.57	853	-1.38	224	-13.00
-2	0.63	459	-6.77	944	-0.50	116	-18.69
-1	0.8	477	-6.43	992	-0.07	53.0	-25.51
0	1	482	-6.33	1011	0.10	23.5	-32.57
1	1.25	484	-6.29	1008	0.07	9.98	-40.02
2	1.6	494	-6.12	968	-0.28	3.77	-48.47
3	2	531	-5.49	890	-1.01	1.55	-56.19
4	2.5	631	-4.01	776	-2.20	0.64	-63.93
5	3.15	804	-1.90	642	-3.85	0.25	-71.96
6	4	967	-0.29	512		0.097	-80.26

Frequency band number x	Frequency f Hz	W_k		W_d		W_f	
		factor X 1000	dB	factor X 1000	dB	factor X 1000	dB
7	5	1039	0.33	409	-7.76		
8	6.3	1054	0.46	323	-9.81		
9	8	1036	0.31	253	-11.93		
10	10	988	-0.10	212	-13.91		
11	12.5	902	-0.89	161	-15.87		
12	16	768	-2.28	125	-18.03		
13	20	636	-3.93	100	-19.99		
14	25	513	-5.80	80.0	-21.94		
15	31.5	405	-7.86	63.2	-23.98		
16	40	314	-10.05	49.4	-26.13		
17	50	246	-12.19	38.8	-28.22		
18	63	186	-14.61	29.5	-30.60		
19	80	132	-17.56	21.1	-33.53		
20	100	88.7	-21.04	14.1	-36.99		
21	125	54.0	-25.35	8.63	-41.28		
22	160	28.5	-30.91	4.55	-46.84		
23	200	15.2	-36.38	2.43	-52.30		
24	250	7.90	-42.04	1.26	-57.97		
25	315	3.98	-48.00	0.64	-63.92		
26	400	1.95	-54.20	0.31	-70.12		

Table A-1 Principal frequency weightings in one-third octaves [11]

APPENDIX B

DEFINITION OF VEHICLE'S COORDINATE SYSTEM

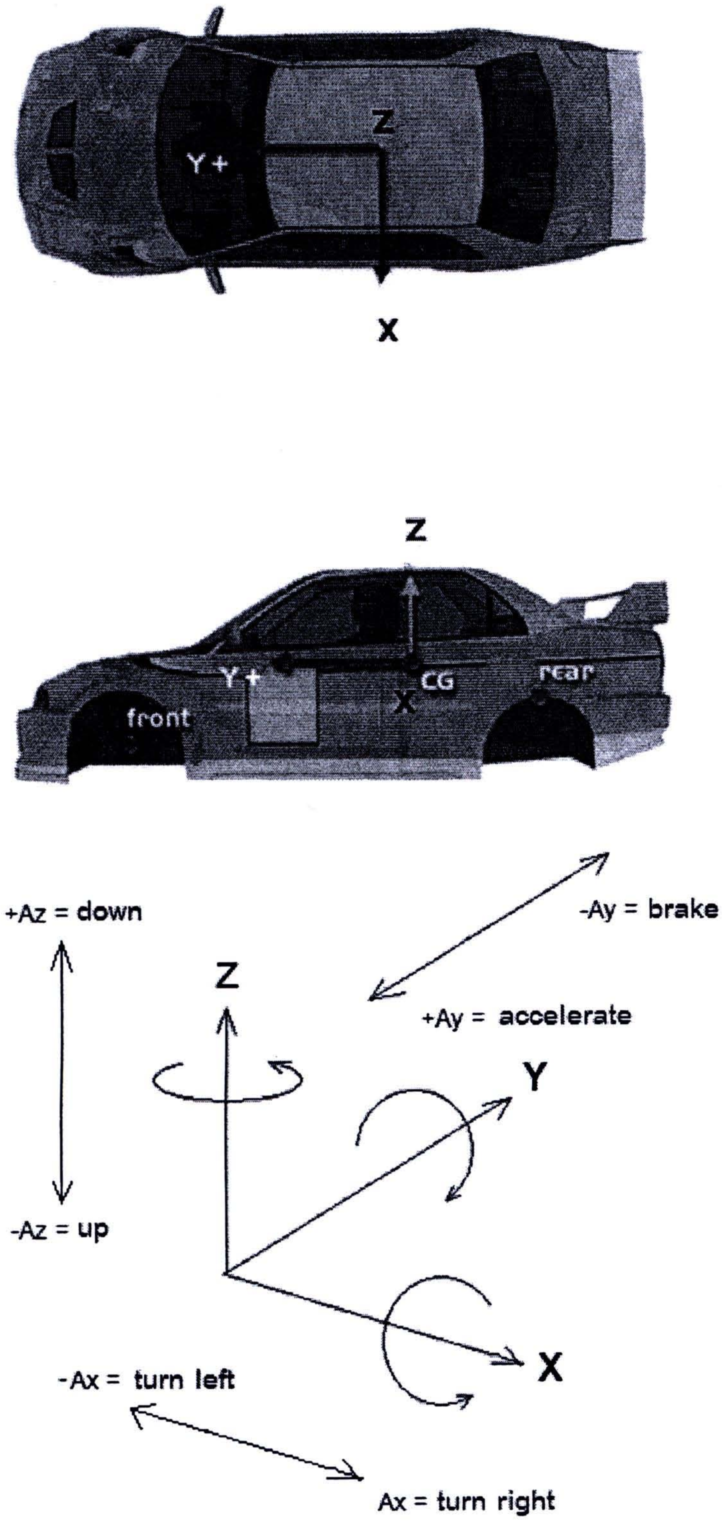

Fig.B-1 Definition of vehicle coordinate system

APPENDIX C

MATLAB M-FILE CODE

C1 Leaf Spring Suspension Property

```
s=-0.15 %%camber height
H=2*s
AE=1.19;AB=0.37125;
CD=0.37125;
DE=0.1;
r=pi/180;
z10=340*r;
z40=110*r; %%Shackle angle
z50=180*r;
y1=AB*sin(z10);x1=AB*cos(z10);y2=H-y1;
x3=AE-DE*cos(z40);y3=-DE*sin(z40);z30=asin((y3-y2)/CD);
x2=x3-CD*cos(z30);
z20=atan2((y2-y1),(x2-x1));
BC=(x2-x1)/cos(z20);
a=1511;b=111.4418;d=a;e=-21.0535;beta=100;nu=1; %%Dahl
parameters
m_b=1870/4;m_w=30;k_w=118440;c_b=2369.3; %% Quarter Car
parameters
```

C2 Ride Comfort Calculation

```
Fs=200;
ax=0;ay=0;az=xs_dd;
h = spectrum.periodogram('rectangular');
hopts3 = psdopts(h);
set(hopts3,'NFFT',2^8,'Fs',Fs,'SpectrumType','onesided');
hpsdz = psd(h,az,hopts3);

fb=[0.5;0.63;0.8;1;1.25;1.6;2;2.5;3.15;4;5;6.3;8;10;12.5;16;
20;25;31.5;40;50;63;80;100];

Wk=[-7.57;-6.77;-6.43;-6.33;-6.29;-6.12;-5.49;-4.01;-1.90;
-0.29;0.33;0.46;0.31;-0.10;-0.89;-2.28;-3.93;-5.80;-7.86;
-10.05;-12.19;-14.61;-17.56;-10.05];
wk=10.^(Wk/20);
Wd=[-1.38;-0.50;-0.07;0.10;0.07;-0.28;-1.01;-2.20;-3.85;-5.82;
-7.76;-9.81;-11.93;-13.91;-15.87;-18.03;-19.99;-21.94;-23.98;
-26.13;-28.22;-30.60;-33.53;-36.99];
wd=10.^(Wd/20);
for i=1:24;
fmin(i)=fb(i)/sqrt(2^(1/3));
end
for i=1:23;
fmax(i) =(2^(1/3))*fmin(i);
end
fmax(24)= 100;
for i=1:24;
pwrz(i)=avgpower(hpsdz,[fmin(i) fmax(i)]);
Pz(i)= pwrz(i)*wk(i);
end
P1=sum(Pz);
```

```
awz=sqrt(P1);
awx=0;
awy=0;
ride=sqrt((awz^2)+(awx^2)+(awy^2))
```

C3 RMS Acceleration

```
for i=0:88;
n(i+1)= norm(xs_dd((i*130)+1:(i*130)+130));
r(i+1)=n(i+1)/sqrt(150);
end
plot((0:5/88:5),r','-x')
for i=0:88;
n(i+1)= norm(xw_dd((i*130)+1:(i*130)+130));
r(i+1)=n(i+1)/sqrt(150);
end
figure,plot((0:5/88:5),r','-x')
hold on;
for i=0:88;
n(i+1)= norm(xb_dd((i*130)+1:(i*130)+130));
r(i+1)=n(i+1)/sqrt(150);
end
plot((0:5/88:5),r','-x')
```

BIOGRAPHY

Mrs. Saelem, Sirithon was born on 26 August 1978 at Ramathibodi hospital, Bangkok. She is a daughter of Mr. Anake and Mrs. Chanthana Meethip. She got married with Mr. Saelem, Sittichai in 2002 and has got two children. For her education, she obtained a Bachelor of Engineering degree in Mechanical Engineering from Thammasat University and the University of Nottingham in the year 2001 and attended the Master of Engineering Program in the year 2006 at the Department of Mechanical Engineering, Chulalongkorn University. During her study, she attended the 23th Mechanical Engineering Network conference held at The Imperial Mae Ping Hotel, Chiang Mai, Thailand during 4 to 7 November 2009 with the article under the topic of "Experimental Verification of Leaf Spring Model by Using a Leaf Spring Test Rig".