

Selective Model Inversion and Adaptive Disturbance Observer for Time-varying Vibration Rejection on an Active-Suspension Benchmark

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I. SIMULATION RESULTS

TABLE I
SIMULATION RESULTS - SIMPLE STEP TEST

LEVEL 1							
Frequency (Hz)	GA (dB)	DA (dB)	MA (dB@Hz)	N ² T ($\times 10^{-3}$)	N ² R ($\times 10^{-3}$)	MV ($\times 10^{-3}$)	TD (ratio)
50	34.6	51.2	3.1@60.9	10.1	3.6	18.3	1.06
55	34.4	56.6	4.0@46.9	8.7	3.7	20.7	1.06
60	34.4	52.2	3.3@50.0	8.2	3.7	20.5	1.07
65	34.4	50.9	3.1@54.7	8.0	3.7	19.8	1.06
70	34.4	55.4	2.8@81.3	8.0	3.8	20.0	1.05
75	34.8	54.8	3.0@67.2	8.5	3.7	19.3	1.05
80	35.0	47.0	3.7@100.0	8.9	3.7	21.6	1.06
85	34.6	45.9	4.9@100.0	9.7	3.6	23.8	1.06
90	32.5	45.8	4.3@101.6	10.8	3.8	27.2	1.04
95	25.4	48.3	4.7@103.1	14.0	3.8	29.5	1.08
LEVEL 2							
Frequency (Hz)	GA (dB)	DA (dB)-(dB)	MA (dB@Hz)	N ² T ($\times 10^{-3}$)	N ² R ($\times 10^{-3}$)	MV ($\times 10^{-3}$)	TD (ratio)
50-70	39.9	43.9 - 49.8	5.2@46.9	42.2	3.9	32.8	1.05
55-75	40.0	51.2 - 50.2	3.8@100.0	29.2	3.9	30.3	1.04
60-80	40.4	47.5 - 42.3	5.5@100.0	29.6	3.7	33.9	1.05
65-85	40.4	46.7 - 42.2	6.7@100.0	25.1	3.7	36.3	1.04
70-90	39.7	50.2 - 41.2	6.1@101.6	36.7	3.7	44.6	1.04
75-95	37.3	49.8 - 43.1	4.9@109.4	40.1	3.7	44.4	1.05
LEVEL 3							
Frequency (Hz)	GA (dB)	DA (dB)-(dB)-(dB)	MA (dB@Hz)	N ² T ($\times 10^{-3}$)	N ² R ($\times 10^{-3}$)	MV ($\times 10^{-3}$)	TD (ratio)
50-65-80	43.9	42.6 - 39.5 - 40.8	6.6@101.6	108.9	3.7	44.7	1.08
55-70-85	43.9	47.9 - 44.8 - 40.4	4.9@101.6	95.7	3.7	49.6	1.05
60-75-90	43.5	45.6 - 47.1 - 40.3	4.9@110.9	75.9	3.7	52.8	1.05
65-80-95	42.0	44.6 - 39.9 - 41.4	5.1@110.9	56.7	3.7	59.1	1.04

TABLE II
SIMULATION RESULTS - CHIRP TEST

Profile	Mean Square $\times 10^{-6}$		Maximum $\times 10^{-3}$	
	\nearrow	\searrow	\nearrow	\searrow
Level 1	3.8	2.9	8.8	5.3
Level 2	87.5	407.0	34.4	96.5
Level 3	197.0	193.0	38.0	38.5

TABLE III
SIMULATION RESULTS - STEP FREQUENCY CHANGES TEST

	Frequency (Hz)	N ² T ($\times 10^{-3}$)	MV ($\times 10^{-3}$)
Level 1	Sequence - 1		
	60→70	20.8	22.1
	70→60	11.2	19.8
	60→50	15.5	19.4
	50→60	10.4	21.0
	Sequence - 2		
	75→85	19.3	22.4
	85→75	10.1	17.4
	75→65	10.7	19.0
	65→75	9.1	19.2
	Sequence - 3		
	85→95	17.1	23.9
	95→85	12.1	23.0
	85→75	10.2	19.0
75→85	8.6	16.9	
Level 2	Sequence - 1		
	[55-75]→[60-80]	52.6	34.3
	[60-80]→[55-75]	55.4	34.5
	[55-75]→[50-70]	70.4	36.7
	[50-70]→[55-75]	60.5	40.0
	Sequence - 2		
	[70-90]→[75-95]	62.5	29.0
	[75-95]→[70-90]	53.6	36.4
	[70-90]→[65-85]	55.1	33.9
	[65-85]→[70-90]	45.6	31.8
Level 3	Sequence - 1		
	[55-70-85]→[60-75-90]	72.6	48.9
	[60-75-90]→[55-70-85]	80.1	54.1
	[55-70-85]→[50-65-80]	109.8	52.5
	[50-65-80]→[55-70-85]	76.2	49.1
	Sequence - 2		
	[60-75-90]→[65-80-95]	60.8	44.5
	[65-80-95]→[60-75-90]	79.9	49.6
[60-75-90]→[55-70-85]	94.0	56.7	
[55-70-85]→[60-75-90]	99.2	52.3	