

MAINTENANCE FORUM 2018

IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

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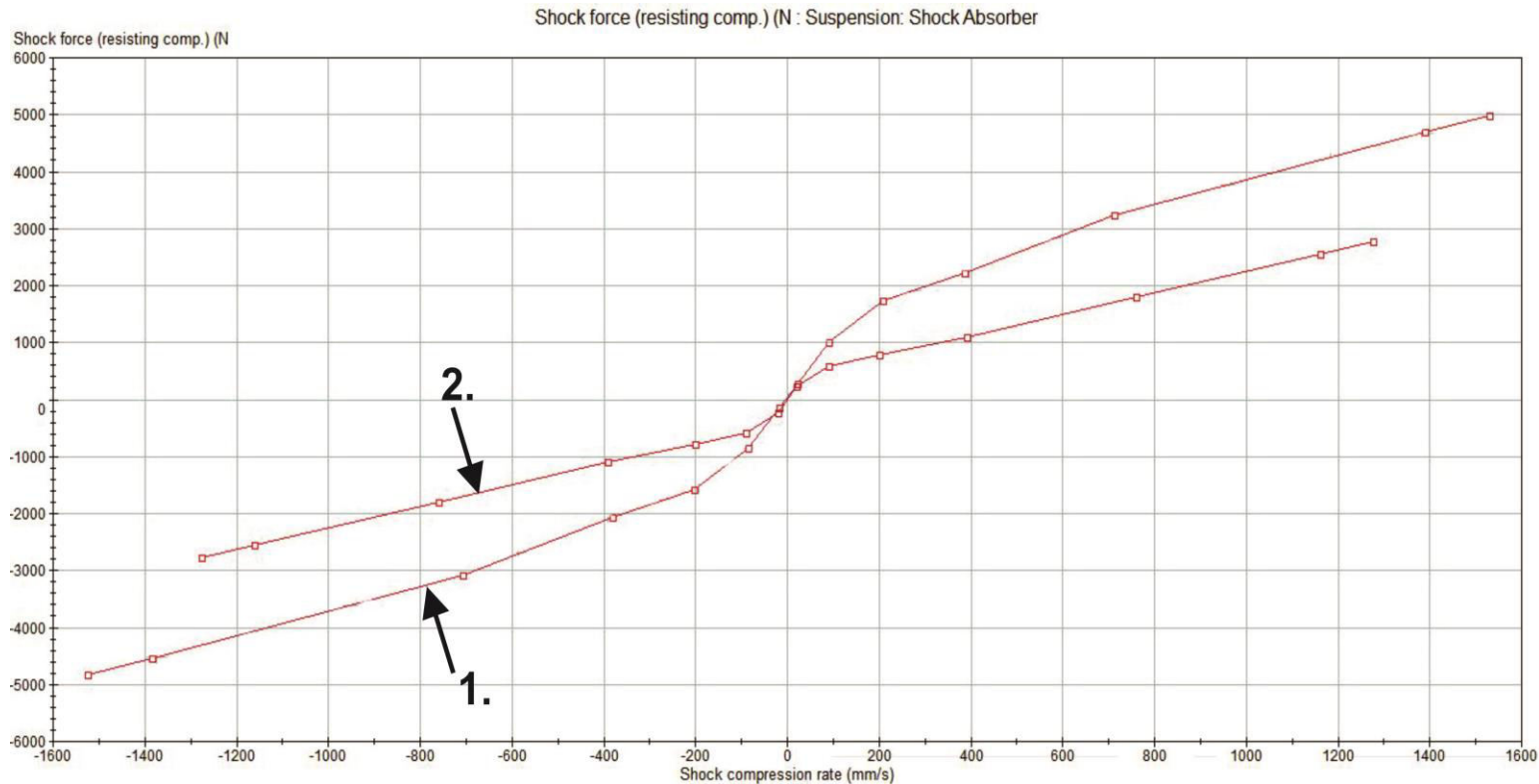
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IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

- Influence of the damping ratio on the behavior of the suspension system and the whole vehicle
- Symmetrical damping
- CarSim 8 software
- Two chosen damping levels of the damper
- Five different tests performed

IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

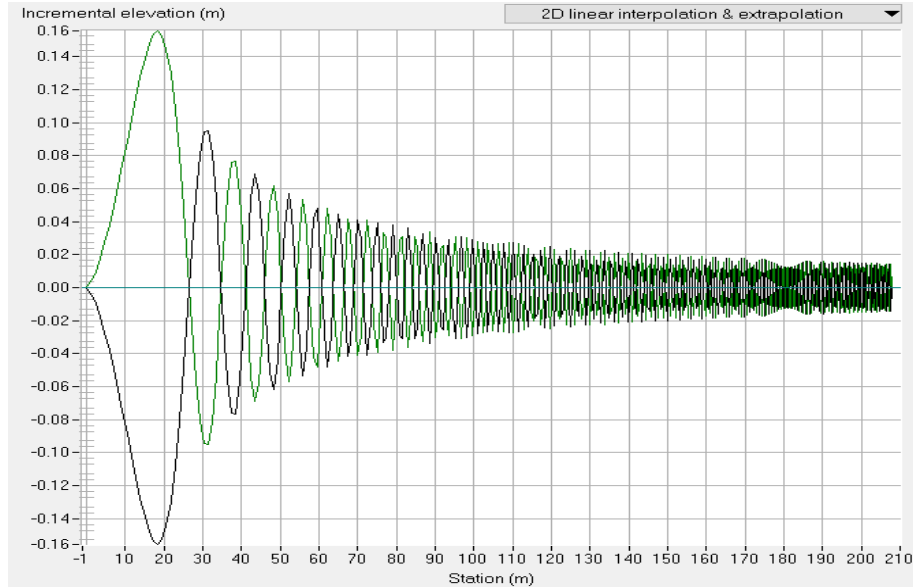


- Curve 1 – Higher Damping Ratio
- Curve 2 – Lower Damping Ratio

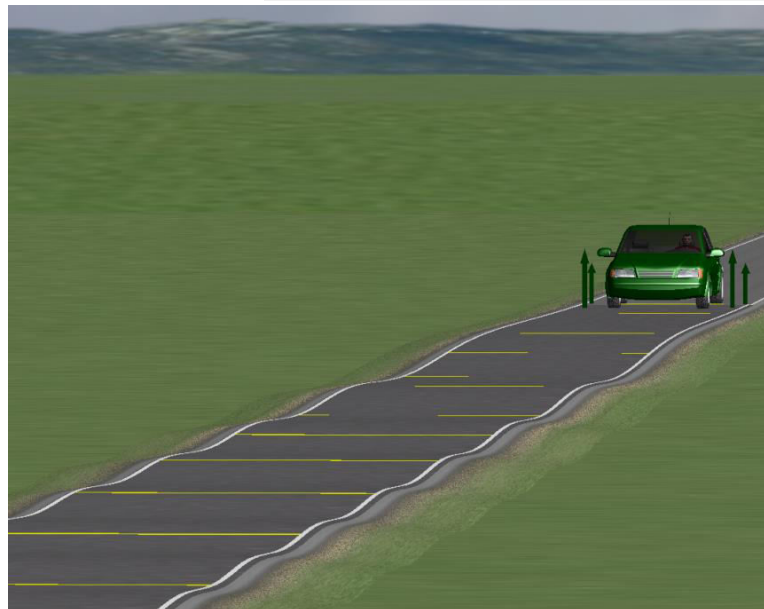
IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

Test 1 - part 1

Road profile of the wavy road section



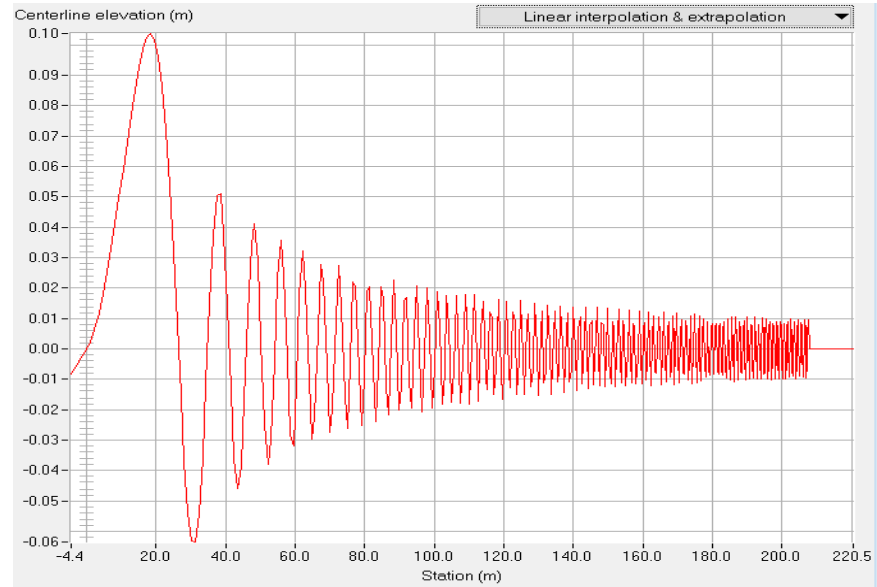
$V = 40 \text{ km/h}$



IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

Test 1 - part 2

Road profile of the cross-slope road section

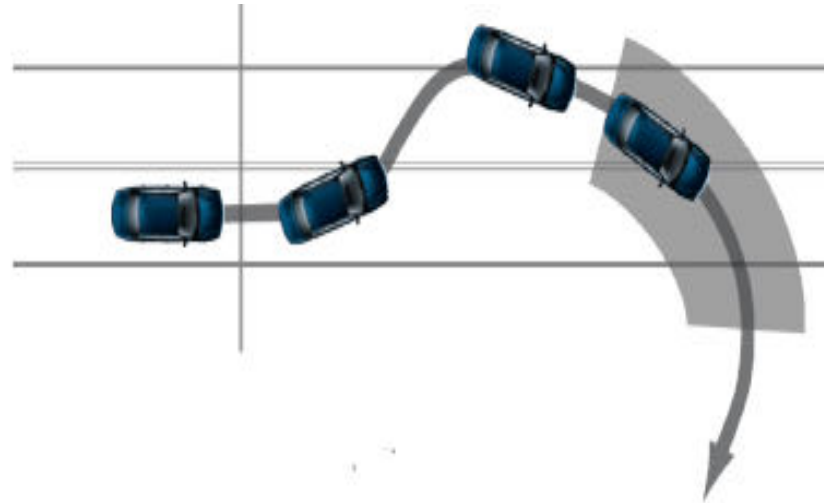


$V = 20 \text{ km/h}$

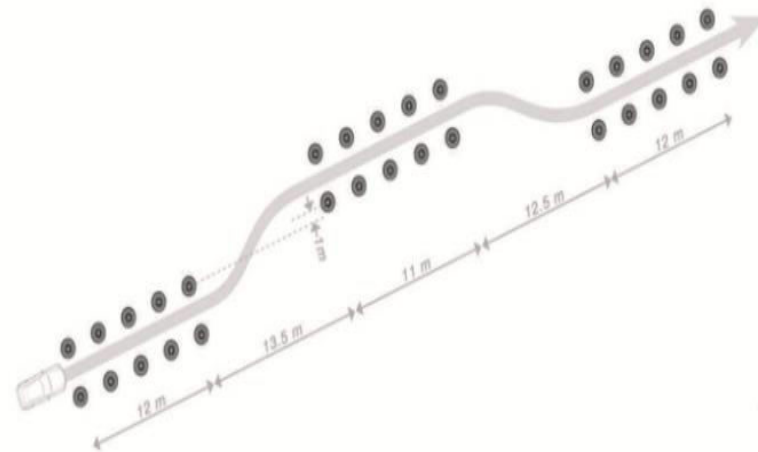


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Test 2 - Fishhook Test

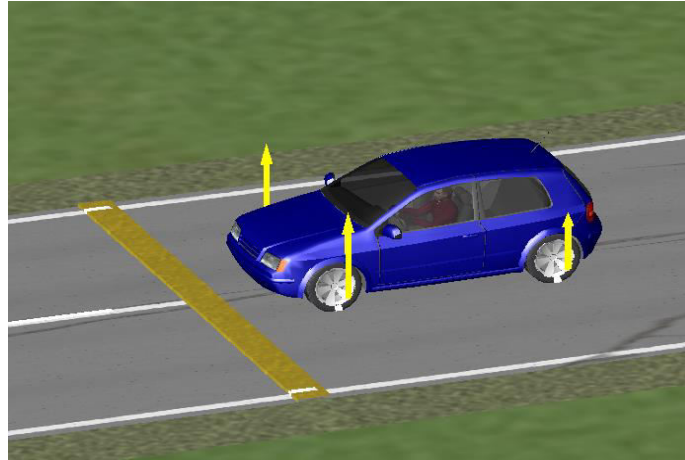


Test 3 - Double Lane Change Test

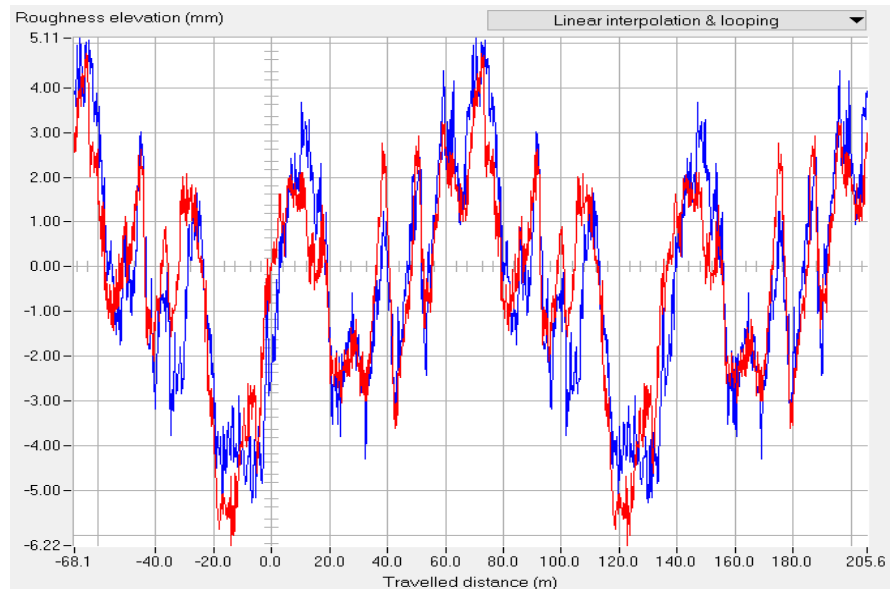


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Test 4 - Vehicle crossing a transversal bump

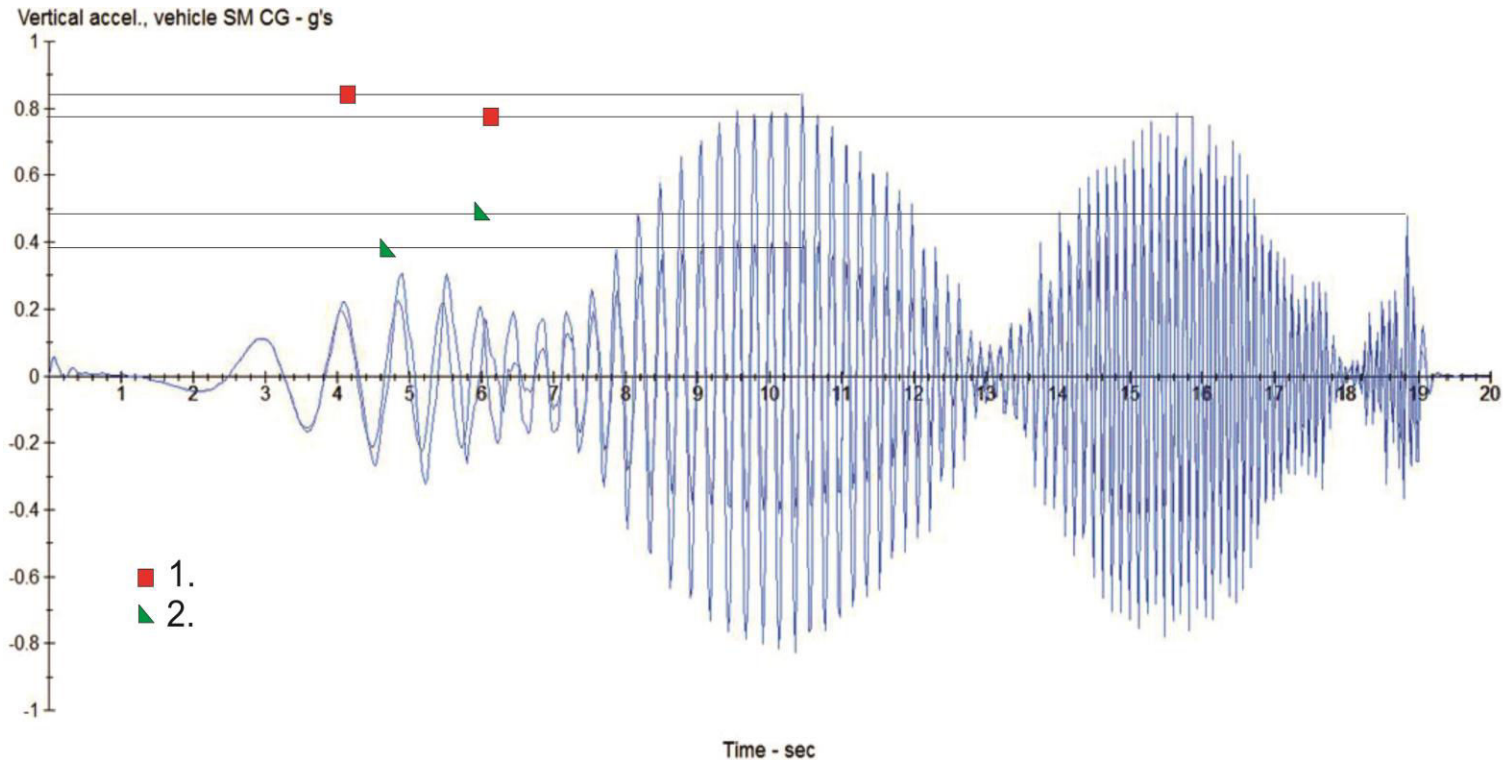


Test 5 - Road with small irregularities



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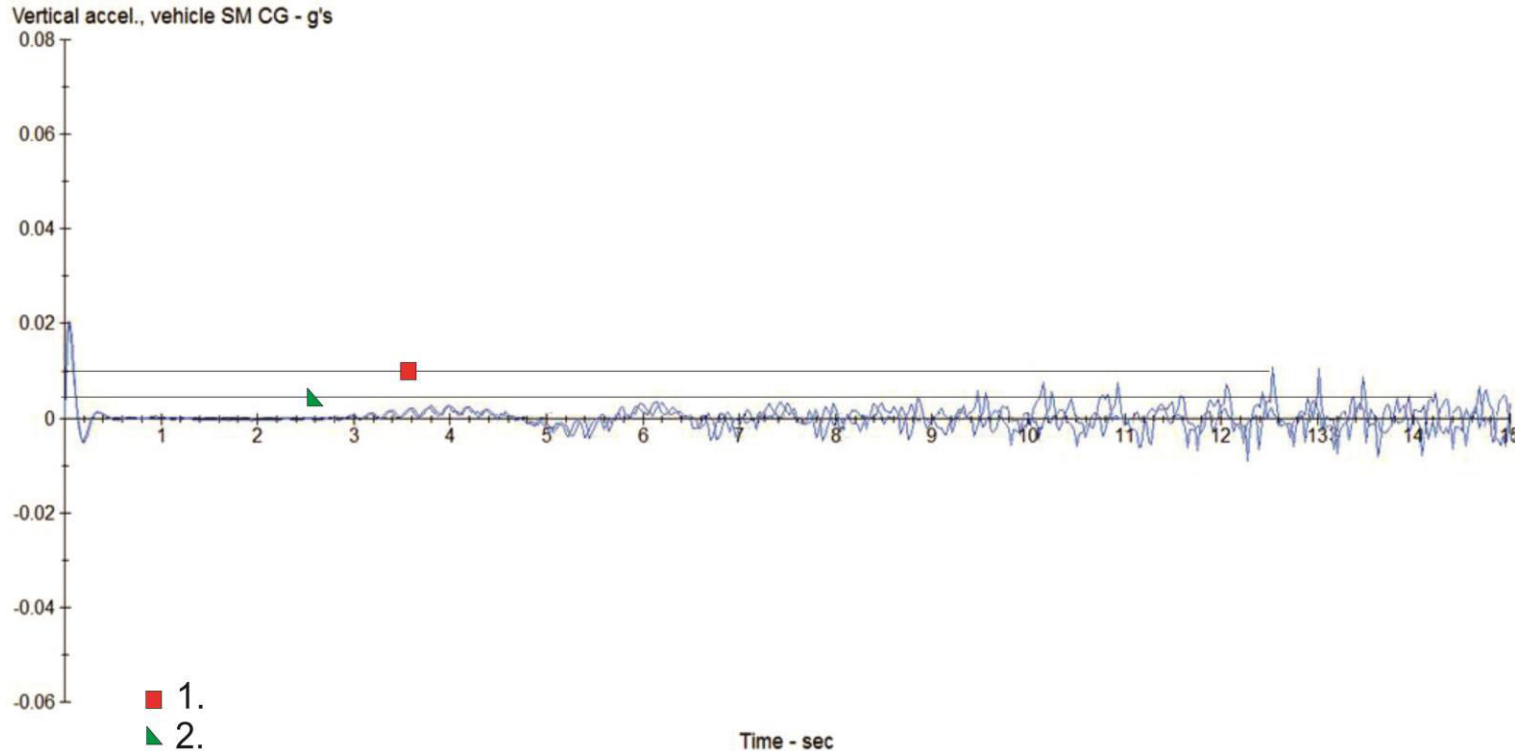
Test 1 - part 1



Vertical acceleration of the vehicle's CG

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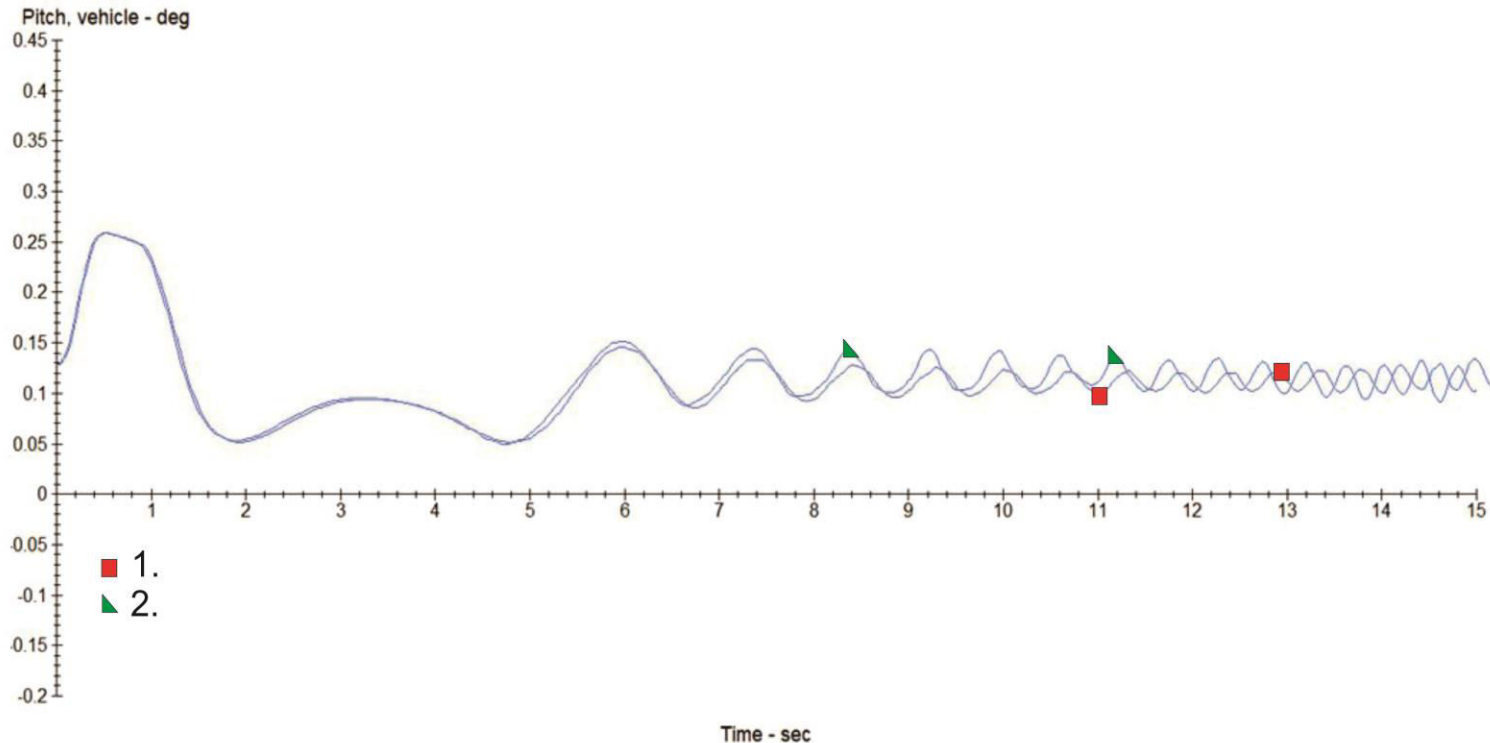
Test 1 - part 2



Vertical acceleration of the vehicle's CG

IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

Test 1 - part 2



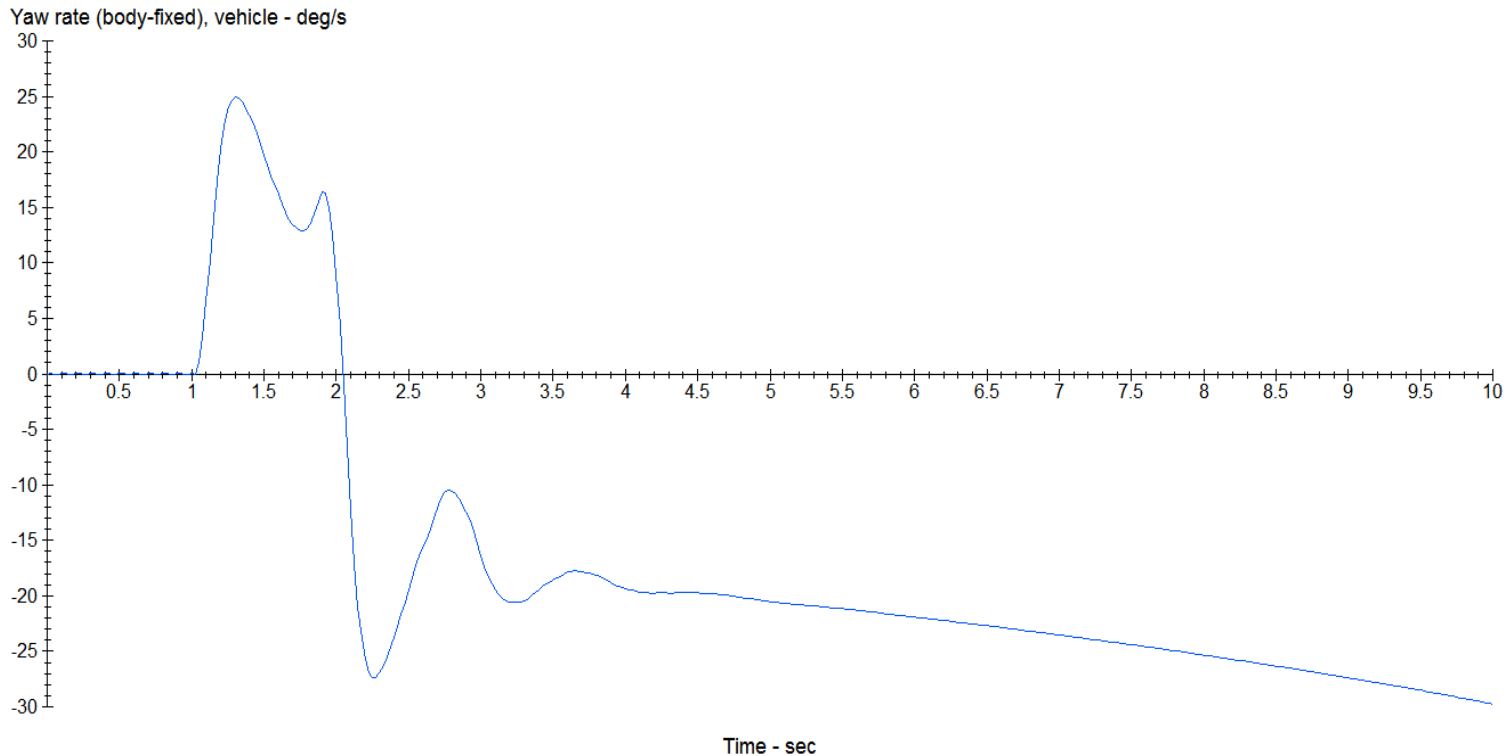
Vehicle pitch

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Dots

Test 2

iipp



Vehicle Yaw Rate

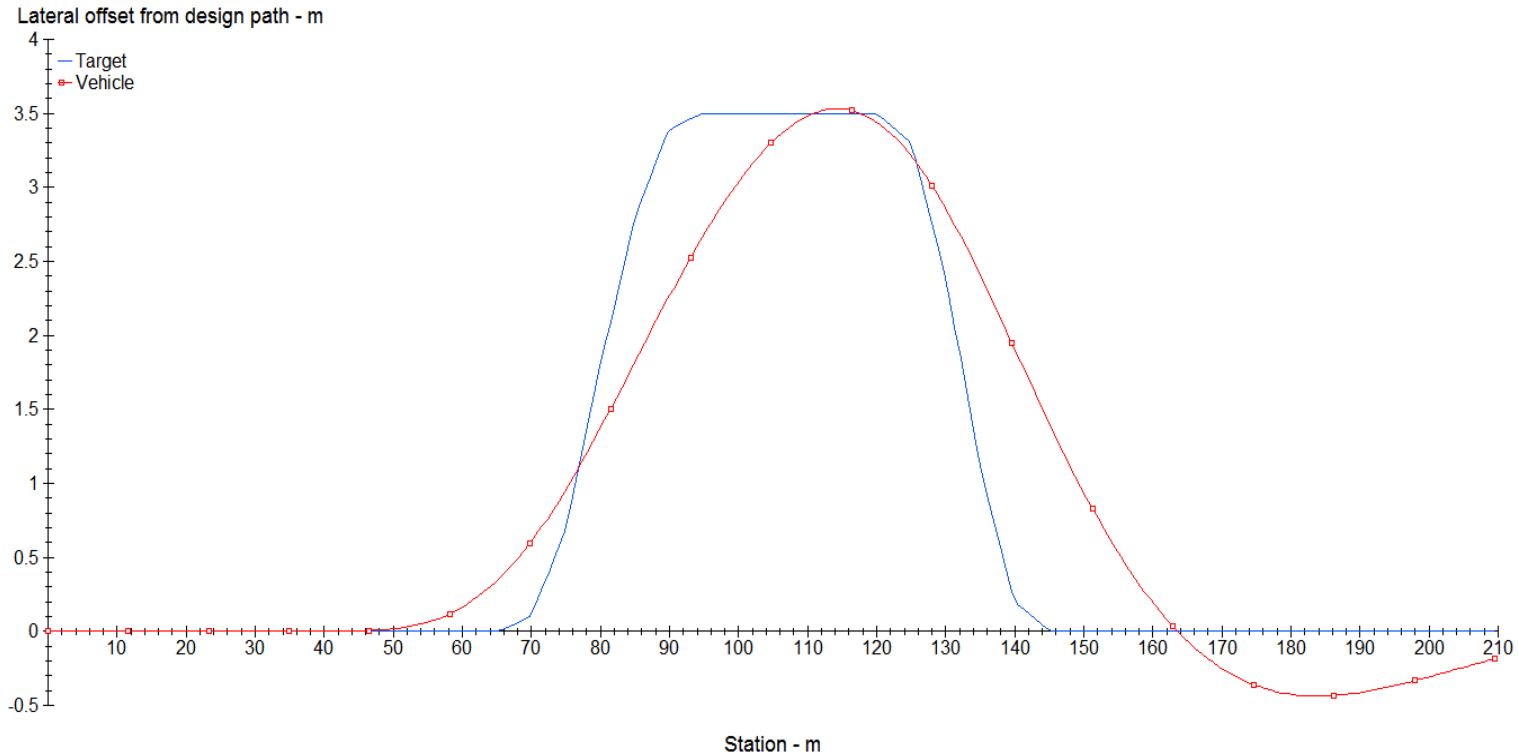
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Dots

iipp

Test 3



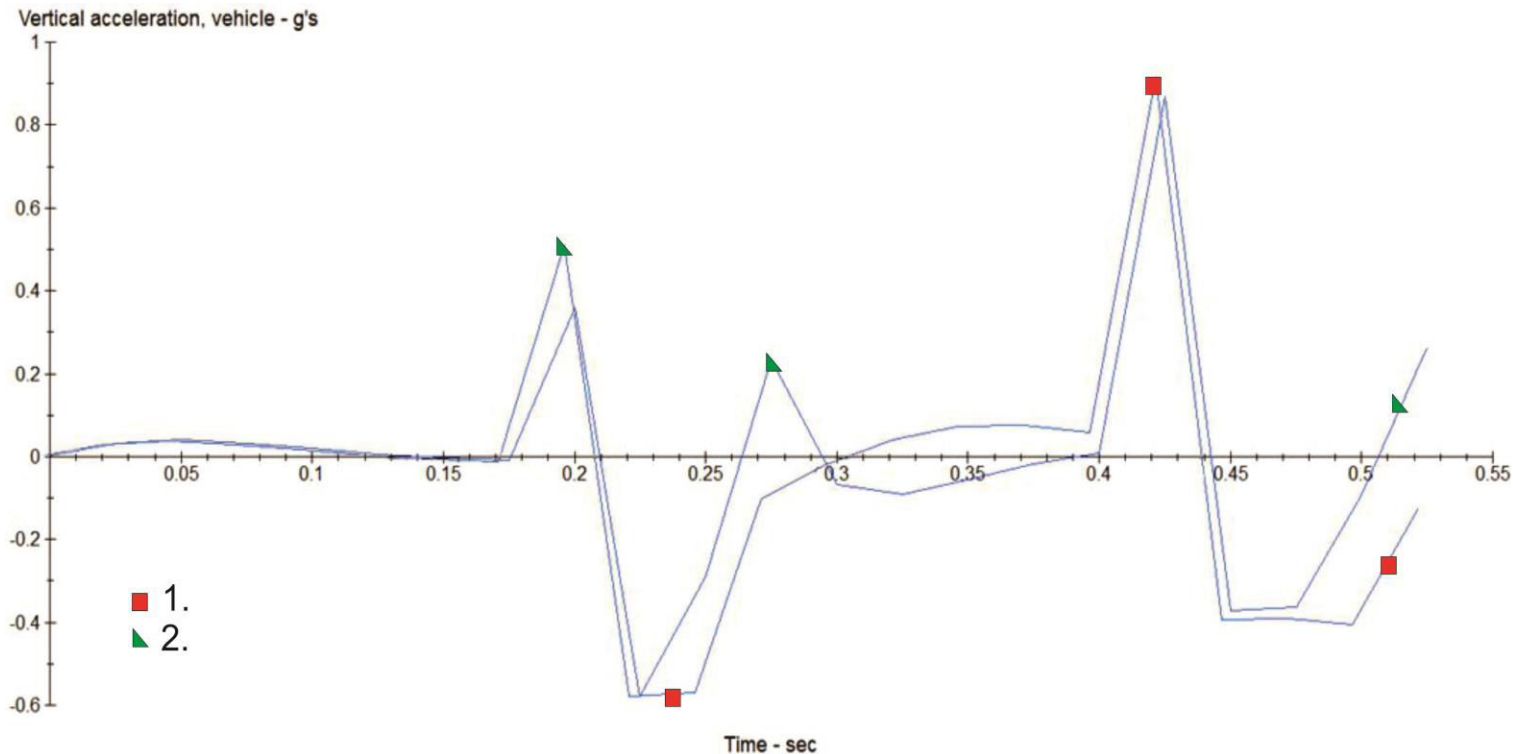
Lateral offset from design path

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Test 4

- Vehicle crossing transversal bump at a speed of 40 km/h

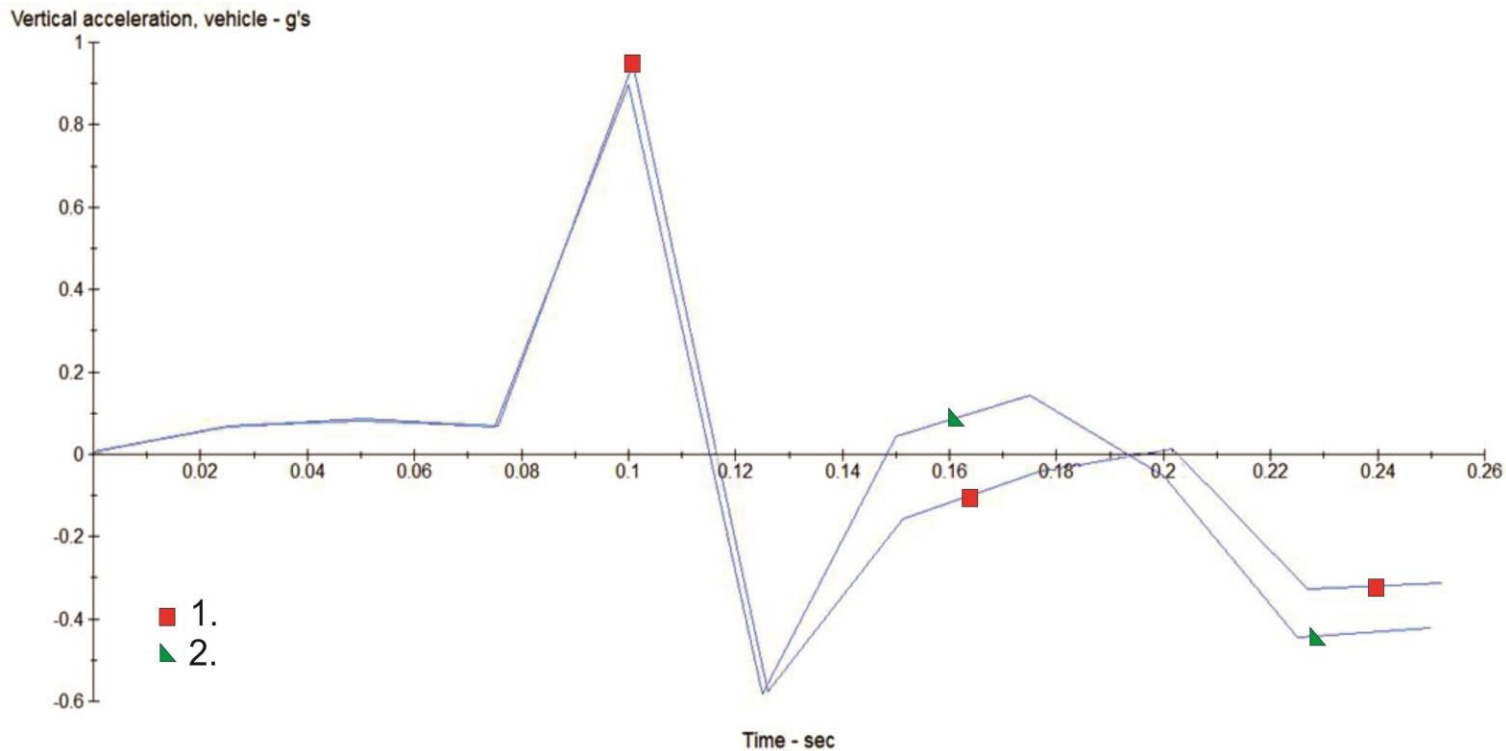


Vertical acceleration of the vehicle's CG

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Test 4

- Vehicle crossing transversal bump at a speed of 80 km/h



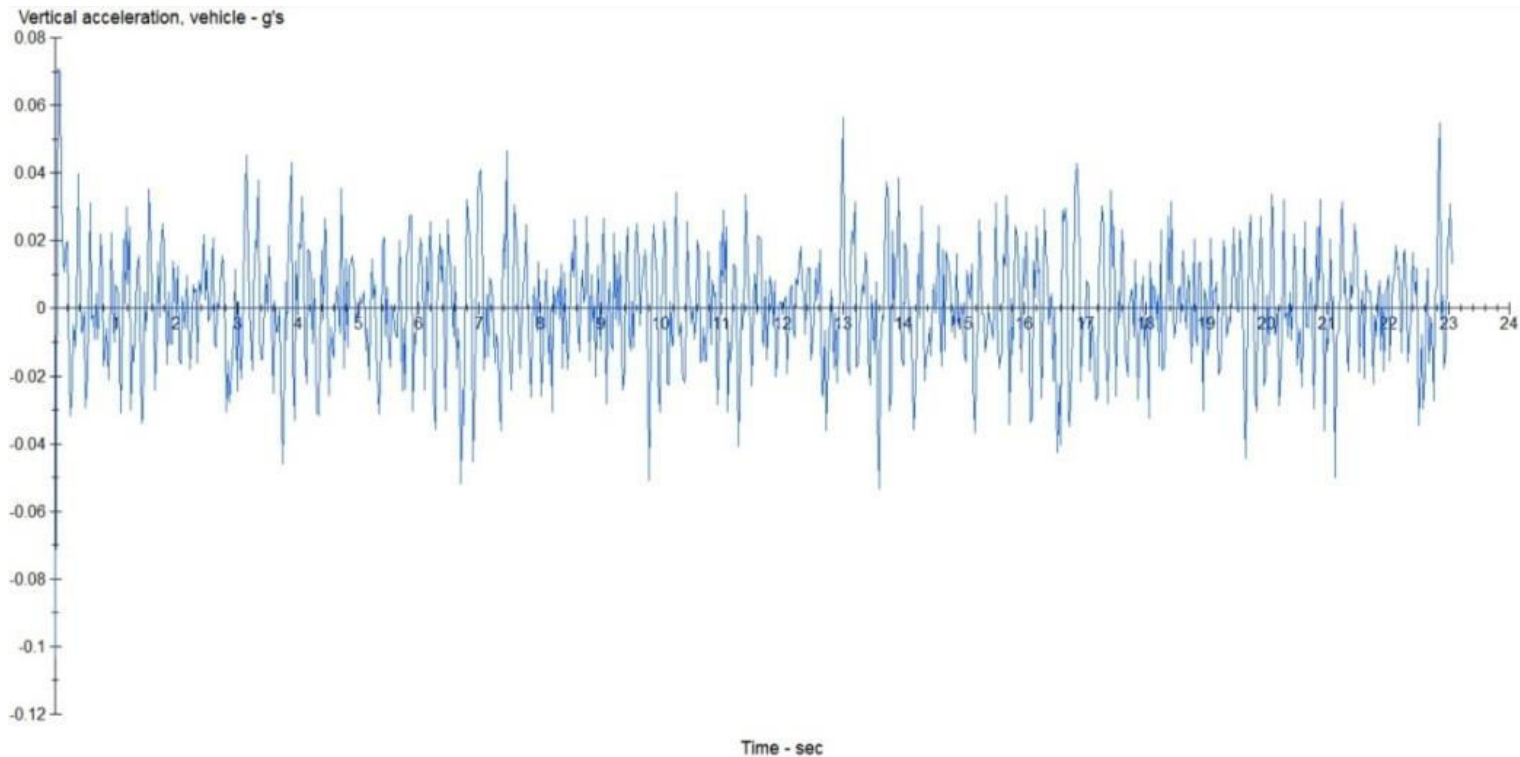
Vertical acceleration of the vehicle's CG

IMPACT OF DAMPING RATIO ON THE BEHAVIOUR OF SUSPENSION SYSTEM

Dots

iipp

Test 5



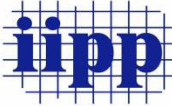
Vertical acceleration of the vehicle's CG

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Weight factor of the test	Criterion	Weight factor of the criterion	Lower damping ratio	Higher damping ratio
Test 1 - first part				
1	Vertical acceleration	0,5	4	1
	Pitch	0,5	1	3
	Total	1	2.5	2
Test 1 - second part				
1	Vertical acceleration	0,33	4	3
	Roll	0,33	4	4
	Pitch	0,33	3	4
	Total	1	3,67	3,67
Test 2				
1	Stability	1	4	4
	Total	1	4	4
Test 3				
0,5	Lateral offset from designed path	1	4	4
	Total	1	4	4
Test 4				
1	Vertical acceleration	1	3 / 2 (2,5)	1 / 4 (2,5)
	Total	1	2,5	2,5
Test 5				
1	Vertical acceleration	1	4	4
	Total	1	4	4
TOTAL POINTS			20,67	20,17

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CONCLUSION

- Main difference - the first part of the Test 1 in regard to passenger comfort.
- Vehicles with different weight and weight distribution can correspond differently on selected damping ratio
- Damping ratio deterioration impact

Dots

iipp

Thank You for Your attention!

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