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1 Introduction

This report contains all the relevant results of the vehicle dynamics tests carried out on the racing car by the CarSim simulation program.

2 Project Description

The table below shows the test program of the project:

	Test	Description	Test conditions		
			V _x Km/h	Z Surface m	Radius m
1	Circular road	Characterisation of the steady state response of the vehicle at the circular road	120	0.01	152.4

Description of configurations:

Conf 1	Conventional Suspension
Conf 2	Creuat Suspension

Matrix

Conventional suspension

SPRINGS MATRIX (ROW 0) (N/MM) = [30.0, -5.0, 0.0, 0.0]
 SPRINGS MATRIX (ROW 1) (N/MM) = [-5.0, 30.0, 0.0, 0.0]
 SPRINGS MATRIX (ROW 2) (N/MM) = [0.0, 0.0, 60.0, 30.0]
 SPRINGS MATRIX (ROW 3) (N/MM) = [0.0, 0.0, 30.0, 60.0]

DAMPERS MATRIX (ROW 0)N/MMS-1) = [2.5, -0.5, 0.0, 0.0]
 DAMPERS MATRIX (ROW 1)N/MMS-1) = [-0.5, 2.5, 0.0, 0.0]
 DAMPERS MATRIX (ROW 2)N/MMS-1) = [0.0, 0.0, 2.0, -0.5]
 DAMPERS MATRIX (ROW 3)N/MMS-1) = [0.0, 0.0, -0.5, 2.0]

Creuat suspension

SPRINGS MATRIX (ROW 0) (N/MM) = [30.0, -5.0, 0.0, 0.0]
 SPRINGS MATRIX (ROW 1) (N/MM) = [-5.0, 30.0, 0.0, 0.0]
 SPRINGS MATRIX (ROW 2) (N/MM) = [0.0, 0.0, 60.0, 0.0]
 SPRINGS MATRIX (ROW 3) (N/MM) = [0.0, 0.0, 30.0, 0.0]

DAMPERS MATRIX (ROW 0)N/MMS-1) = [2.5, -0.5, 0.0, 0.0]
 DAMPERS MATRIX (ROW 1)N/MMS-1) = [-0.5, 2.5, 0.0, 0.0]
 DAMPERS MATRIX (ROW 2)N/MMS-1) = [0.0, 0.0, 4.0, 0.0]
 DAMPERS MATRIX (ROW 3)N/MMS-1) = [0.0, 0.0, 1.0, 0.5]

3 Vehicle specifications:

3.1 Technical characteristics

Dimensions		
	Length	3500 mm
	Width	1500 mm
	Height	600 mm
	Length between wheels	2500 mm
	Width between wheels	1200 mm
Engine	Size	5000 cc
Sprung mass		700 Kg
Unsprung mass		
	Front	10 kg
	Rear	10 kg
Rear – wheel drive		Viscous – Gear ratio 5.0
Front suspension		
	<i>Parts number</i>	

	Stabiliser	Spring 35 KN
		Damper
Rear suspension	<i>Parts number</i>	
	Stabiliser	Spring 35 KN
		Damper
Nominal steering	Front Gear ratio	16.0 deg/deg
	Rear Gear ratio	16.0 deg/deg
Wheels	Front Rim dimension	R15
	Front Tire width	250 mm
	Rear Rim dimension	R21
	Rear Tire width	400 mm

3.2 Wheel alignment

The wheel alignment of the vehicle was done with the vehicle in the test condition (with instrumentation, without driver):

Front

Camber
Caster
Kingpin inclination

Left	Right
0.0°	0.0°
5.0°	5.0°
8.0°	8.0°

Rear

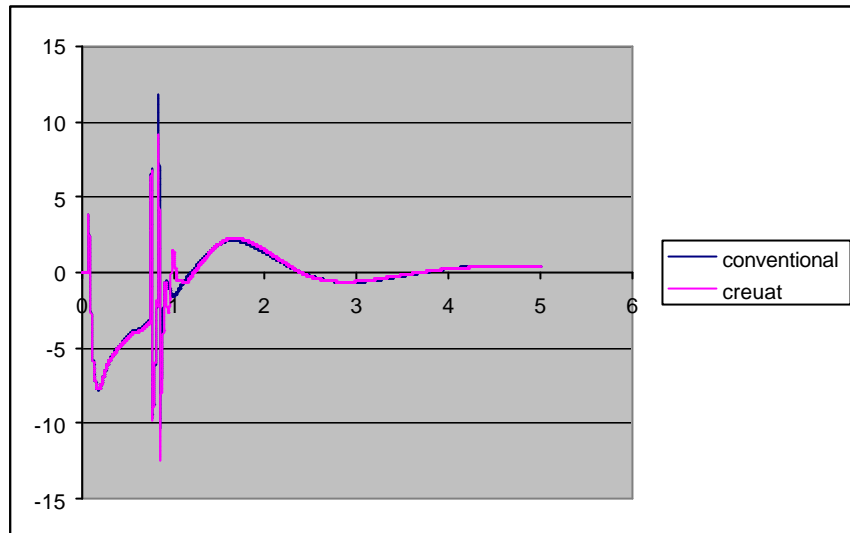
Camber
Caster
Kingpin inclination

0.0°	0.0°
1.0°	1.0°
8.0°	8.0°

4 Test results
4.1 Circular road
General conditions

Road surface:	Asphalt
Friction surface:	0.85
Frequency:	500 Hz
Time step:	0.002 Hz

Slip angle rate



Yaw rate

