

Finding H_s and H_{sra} when H_t is known

Finding H_{sra} CG height of sprung mass above roll axis

(Using Example 1 data)

M_{sf}	= 312 kg	Front sprung mass
M_{sr}	= 328 kg	Rear sprung mass
M_{usf}	= 60kg	Total front unsprung mass
M_{usr}	= 70kg	Total rear unsprung mass
L	= 2248mm	Wheelbase
H_t	= 363 mm	Height of CG of total mass above ground
H_s	=	Height of CG of sprung mass above ground
H_{sra}	=	Height of CG of sprung mass above roll axis
h_f	= 10mm	Front rc height
h_r	= 50 mm	Rear rc height
r	= 270 mm	Rolling radius

Finding H_s , CG height of Sprung Mass

Knowing H_t the height of the CG of the whole car

Take moments about a horizontal axis :

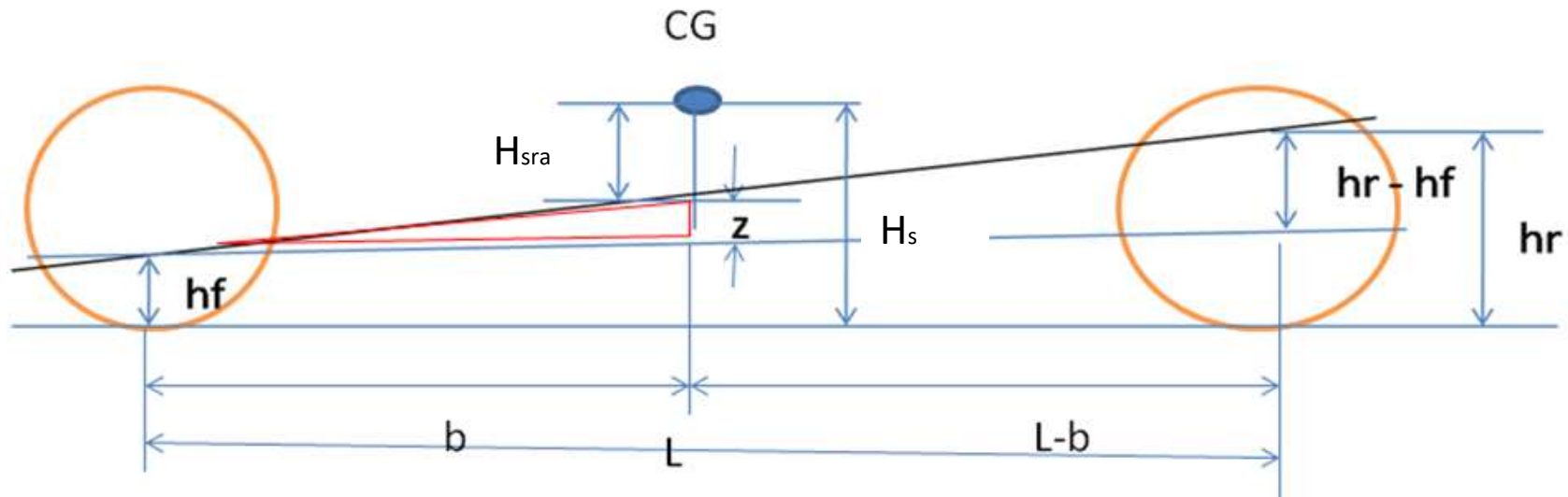
$$(H_t \times M_t) = (M_{us} \times r) + (M_s \times H_s)$$

$$(363 \times 770) = (130 \times 277) + (640 \times H_s)$$

$$H_s = \frac{(363 \times 770) - (130 \times 277)}{640}$$

$$\text{So } H_s = 380.5$$

Relationship between H_s and H_{sra}



Finding distance of CG from front axle

Take moments to find dimension b, the distance of CG of sprung mass from front axle

$$640 * b = 2248 * 328$$

$$b = 1152.1$$

Giving $b = 1152.1$ mm from the front wheel
(ie the length of the red triangle)

Height of CG of sprung mass above roll axis

By similar triangles :

$$\frac{h_r - h_f}{L} = \frac{Z}{b}$$
$$\frac{40}{2248} = \frac{Z}{1152.1}$$

Giving $Z = 20.5 \text{ mm}$

Where Z is the height of the roll axis above the front roll centre height at the position of the CG of the sprung mass

H_s , the height of CG of the sprung mass above ground of = **380.5mm**

The height of the CG of sprung mass above the roll axis is then found from

$$380.5 - 20.5 - 10 = \mathbf{350 \text{ mm}}$$

Finding H_{sra} the Height of CG of sprung mass above roll axis

