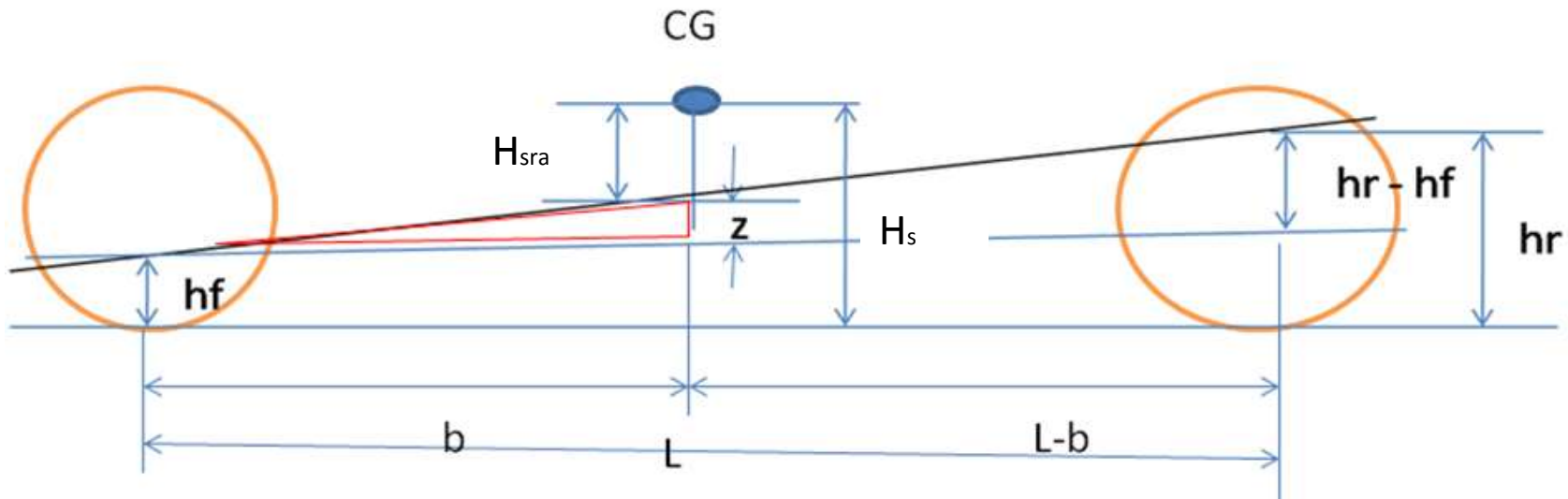


Finding the height of the CG above the roll axis

Finding the Height of CG above roll axis



Example to find CG height above roll axis

As an example assume:

$M_f = 300 \text{ kg}$ Total front scale reading

$M_r = 342 \text{ kg}$ Total rear scale reading

$L = 2351 \text{ mm}$ Wheelbase

$H_s = 340 \text{ mm}$ Height of CG of sprung mass above ground

$h_f = 95 \text{ mm}$ Front rc height

$h_r = 238 \text{ mm}$ Rear rc height

$$642 * b = 2351 * 342$$

Giving $b = 1255 \text{ mm}$ from the front wheel ie the length of the red triangle

CG height above roll axis

- By similar triangles therefore:

$$\frac{143}{2351} = \frac{Z}{1255}$$

- Giving $Z = 76 \text{ mm}$ Where Z is the height of the triangle at the position of the CG
- The height of the CG above the ground H' is 340mm
- This give a value of

$$H = 340 - (76 + 95) = 169 \text{ mm}$$

Preliminary work

The following example will be covered in class in the next couple of weeks. You can prepare for the work by determining H_{sra}

Example 2 Data

T_f	Front track	1.270 m
T_r	Rear track	1.335 m
T_s	Spring track	0.96m
L	Wheel base	2.351 m
H_{tot}	Total mass CG height above ground	0.3538 m
H_s	Sprung Mass CG Height above ground	 m
H_{sra}	Sprung mass CG height above Roll axis	 m
M_{sf}	Front sprung mass	312 kg
M_{sr}	Rear sprung mass	328 kg
M_{usf}	Front total unsprung mass	76 kg
M_{usr}	Rear total unsprung mass	88 kg
r	Rolling radius of tyre	0.275m
h_f	Front RC height	95 mm
h_r	Rear RC Height	238 mm
K_{wr}	Rear wheel rate	29,155 N/m
K_{wf}	Front wheel rate	60 025 N/m
SL_f	Front suspension leverage	1.83
a_y	Lateral acceleration	6m/s ²
Front suspension - unequal length double wishbones		
Rear suspension - live axle		

Method to find H_{sra}

1. Find Height of CG of sprung mass above the ground H_s (using moments – car vertical)
2. Find dimension b the distance of the CG from the front axle (using moments – car horizontal)
3. Using similar triangles find the height of the roll axis at b from the front axle.
4. Find the height of the CG of the sprung mass above the roll axis H_{sra}