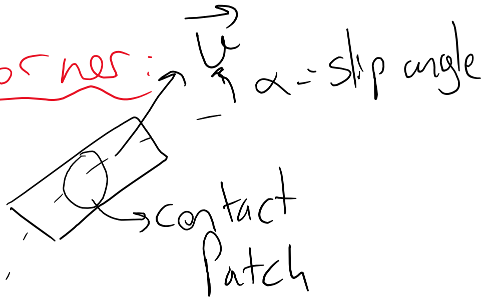
Suspansiyon

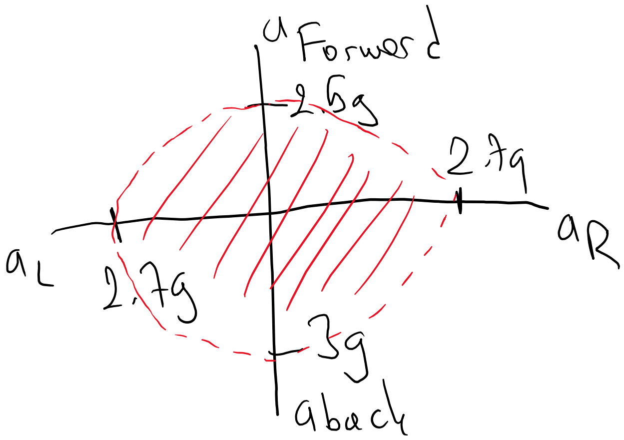
Corner:



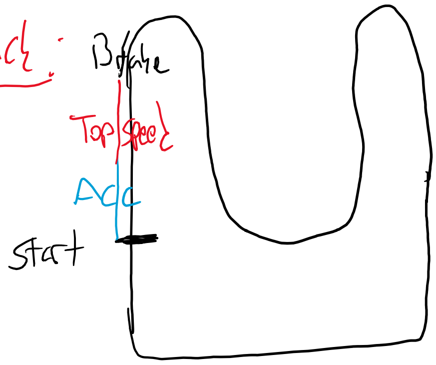
Drive and Brake:

$$\text{slip Ratio} = \left(\frac{R_e \omega}{v} - 1\right)$$

+ Drive
(−) Braking

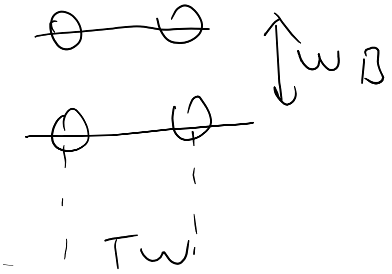


Track:



$$\Rightarrow \downarrow t = \frac{L_{fixed}}{V_{avg}\uparrow}$$

Desining to wheelBase:



* minimize to rolos or pocking
* Track width

$\frac{WB}{TW}$	~ 1	~ 1.7	> 2
	Cornering Dominant	Mid	Straightline Dominant

TW ↑

- Reduced weight Trosfer in Turn
- Higher cornering g's w/ out flipping
- Reduced straightline stability

Suspension Geometry:

1-) Keep tires in contact with ground maximizing traction.

2-) Need to travel irregularities in surface

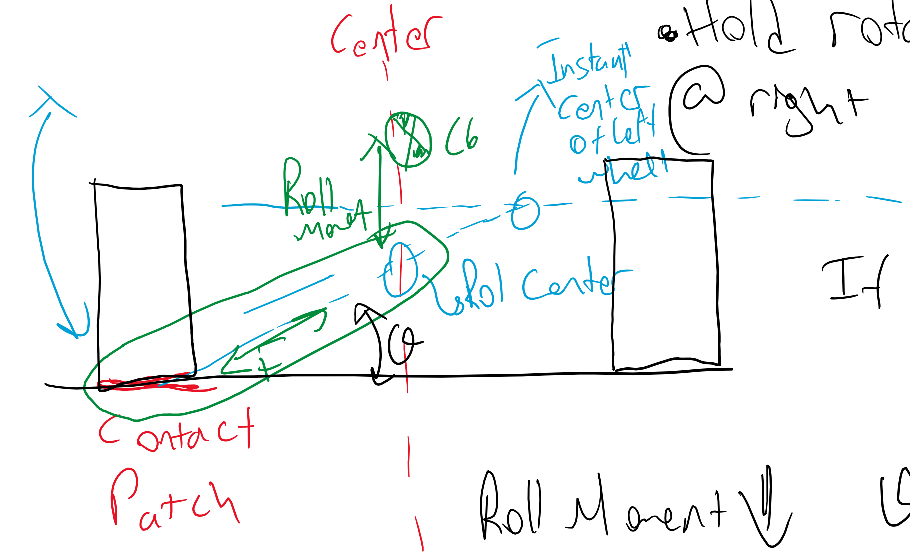
→ Minimize transfer of this motion to spring mass

Two Scenarios:

a) Bump

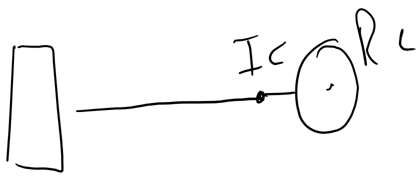
b) Roll

- Reduce compliance A bit stiff
  - Feed loads into nodes on few chassis order a wide base.
  - Hold rotation with large moments @ right angles.



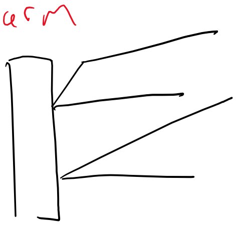
If close to Roll, θ↑

Roll Moment ⇓ θ⇓ Avoid Jacking

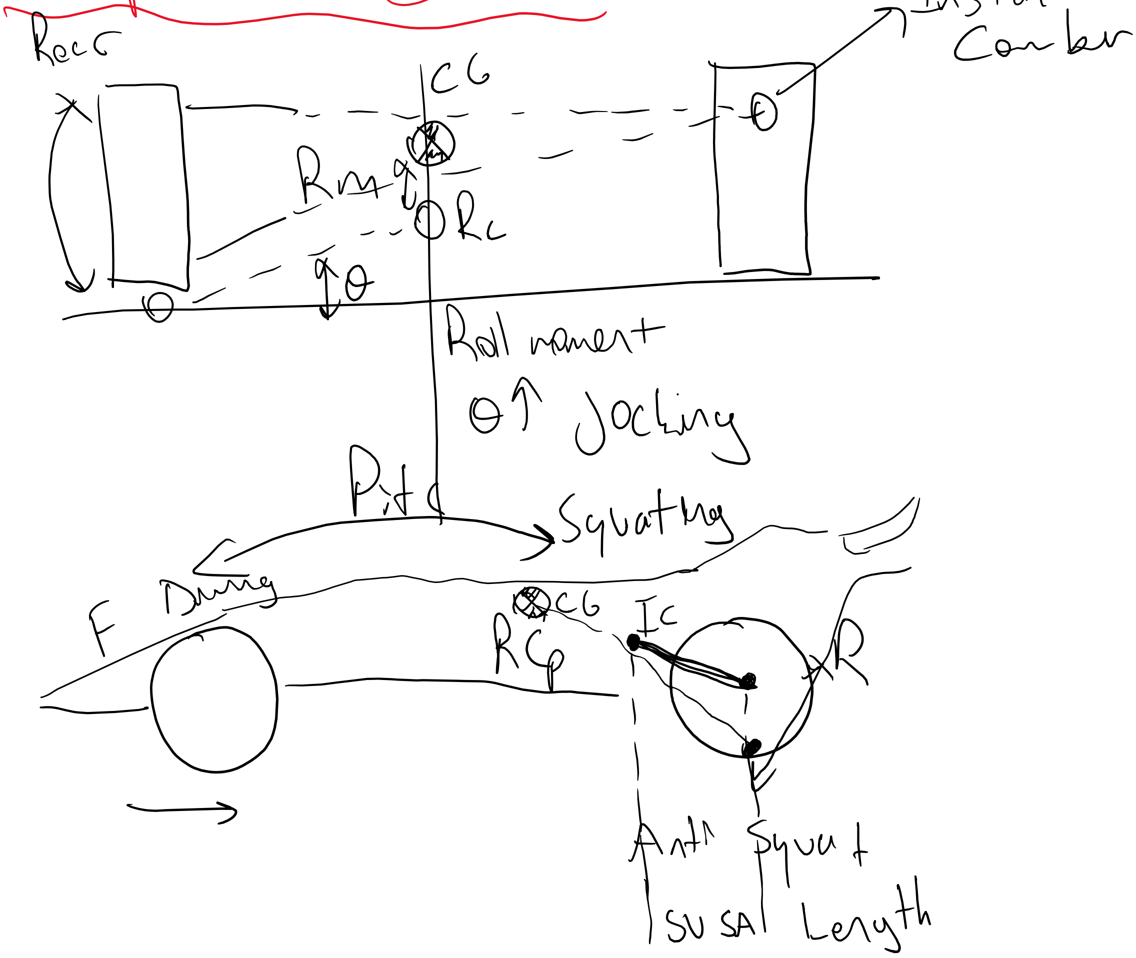


Swing Axle Jacks like crazy.

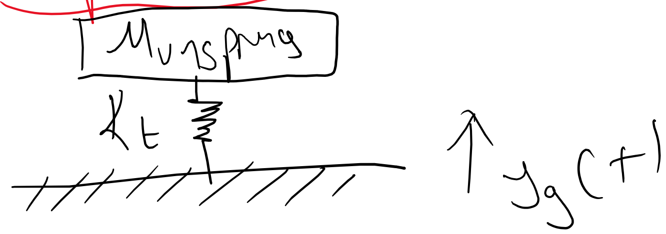
2 arm



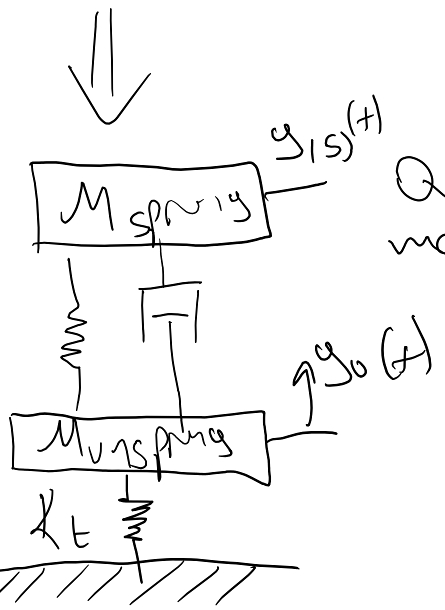
Suspension Dynamics :



Suspension Dynamics



mass that is between springs and ground. tire + upright + 1/2 suspension arm



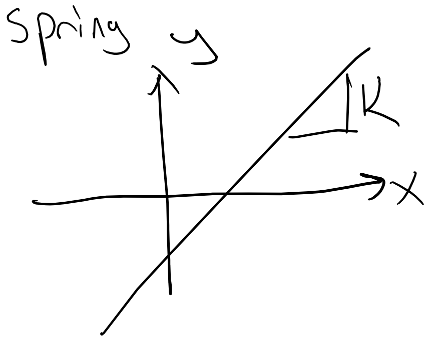
Quarter car model Mspring is corner mass + unsprung mass on that corner.

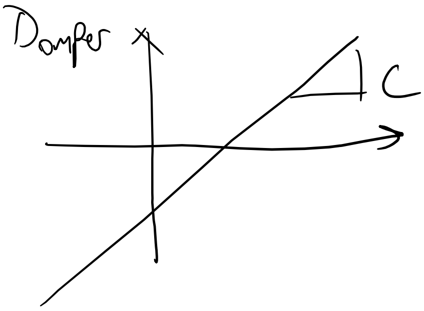
- Minimize unsprung mass & $\frac{m_{us}}{M_s}$

To get in the ball park use ride frequencies & damping ratios

$$\omega_n = \frac{1}{2\pi}\sqrt{\frac{K}{m}}$$

$$\text{Ride Frequency} = \frac{1}{2\pi}\sqrt{\frac{K_t \cdot K_s}{(K_t + K_s)\, m_{sprung}}} \sim \frac{1}{2\pi}\sqrt{\frac{K_{WR}}{m_{sprung}}}$$





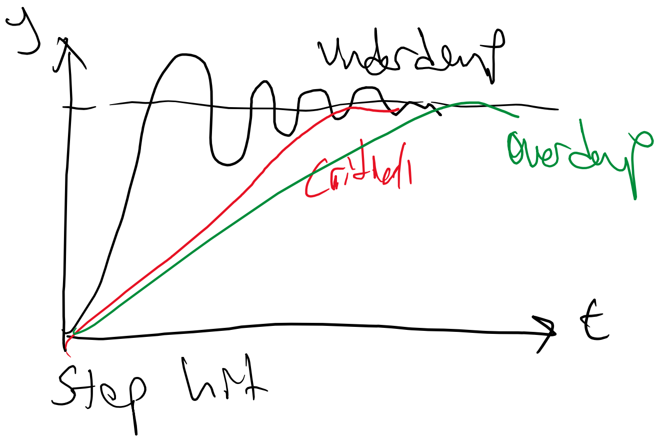
$$\zeta = \frac{C}{2 m_{sprung}\, \omega_{n\,sprung}}$$

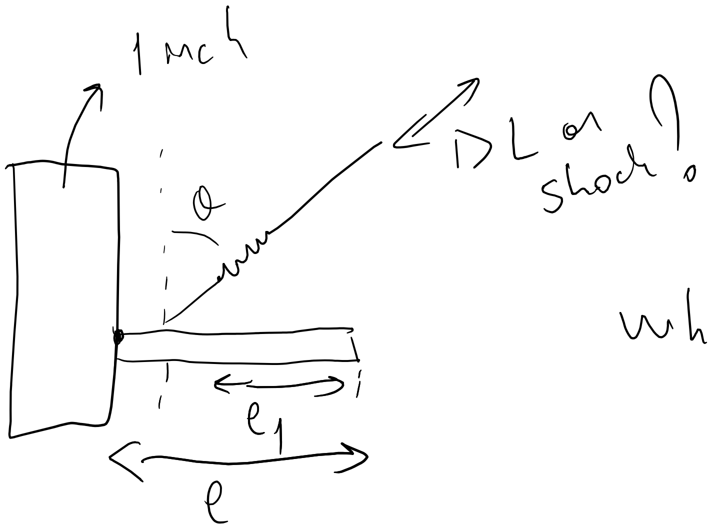
ζ = Damping Ratio < 1

> 0.5 under Damped

$\Rightarrow 1$ critically damp

> 1 over damped





*If tire 1 inch up.

$$\text{wheel Rate} = \frac{F_{tire}}{D_{y\,tire}}$$