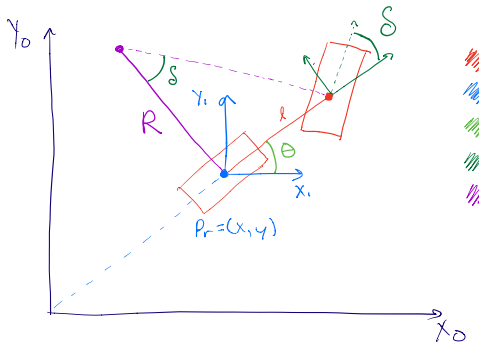
Dubin's Car



- vehicle length: l
- position: $p_r = (x, y)$
- orientation/heading: θ

} pose: $[x, y, \theta]^T$

- steering: δ
- turning radius: R
- speed: v

Dynamics:

$$\dot{x} = v\cos\theta$$
$$\dot{y} = v\sin\theta$$
$$\textcircled{*}\quad \dot{\theta} = \frac{v}{l}\tan\delta$$

} from physical intuition of motion

→ how to get this?

① note that: $dp_r = R\,d\theta$ and that: $v = \frac{dp_r}{dt}$

$$\rightarrow \frac{dp_r}{dt} = \frac{R\,d\theta}{dt} = R\dot{\theta} = v$$

(v: assumed given!)

($R\dot{\theta}$: how to compute?)

② recall some trig: $\tan\delta = \frac{l}{R} \rightarrow R = \frac{l}{\tan\delta}$

rearranging ① and ② gives ⋆!