
Algorithm 1 v_t, T_{arrive} *Simulation calculation*

Input: $g, \mu_g, C_d, M, H, L_{race}, v_w, \theta_w, \alpha_x, \theta_x$

Output: v_t, T_{arrive}

```

1:  $x \leftarrow 0, v_0 \leftarrow 0, \theta \leftarrow \theta_0, flag \leftarrow 0$ 
2: while  $x \leq L_{race}$  do
3:   if  $t = 0$  then
4:      $F \leftarrow kMg$ 
5:   else
6:      $F \leftarrow \frac{MP_t}{v_t}$ 
7:   end if
8:    $FA \leftarrow 0.0293H^{\frac{29}{40}}M^{\frac{17}{40}} + 0.0604$ 
9:    $\theta_{before} \leftarrow \theta, \theta \leftarrow \theta_x$ 
10:  if  $\theta \neq \theta_{before}$  then
11:     $flag \leftarrow 1$ 
12:  end if
13:  if  $flag = 1$  and  $v_t \leq v_{turn}$  then
14:     $flag \leftarrow 0$ 
15:  end if
16:  if  $flag = 0$  then
17:     $a \leftarrow \frac{F - Mgsin\alpha_x - \mu_g Mgc\cos\alpha_x - C_d FA(v_t^2 + v_w^2 + 2v_t v_w \cos(\theta_w - \theta_x))}{M}$ 
18:  else
19:     $a \leftarrow -cv_t$ 
20:  end if
21:   $v_{t+dt} \leftarrow v_t + a dt$ 
22:   $x \leftarrow x + v_t dt$ 
23:   $t \leftarrow t + dt$ 
24: end while
25:  $T_{arrive} \leftarrow t$ 

```
