

## Homework 4

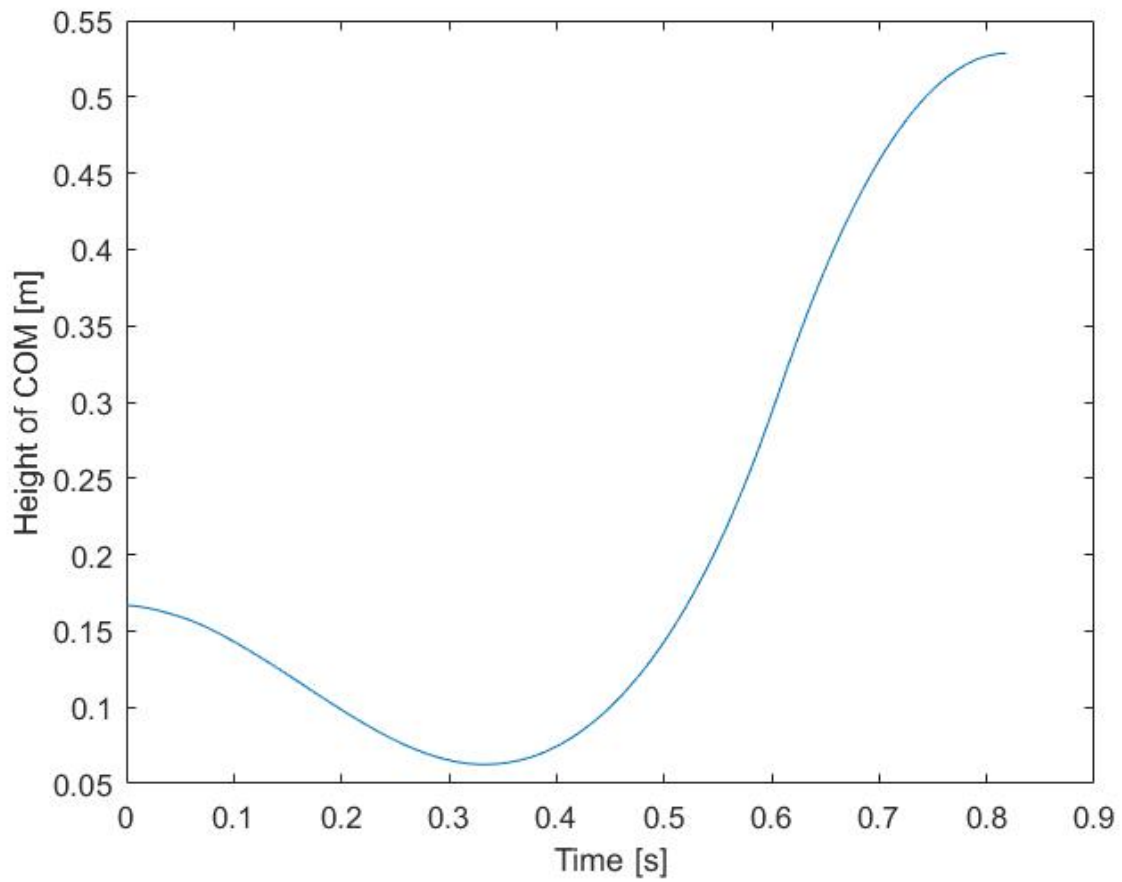
### 1.3.4 Maximum Height

Initial guess:

$tf = 0.5$

$ctrl.tf = 0.4$

$ctrl.T = [1.5 \ 1.5 \ 1.5]$



Final values:

$tf = 0.818020223418949$

$ctrl.tf = 0.614915226320635$

$ctrl.T = [0.203099434247268 \quad 1.53862211745677 \quad 1.97092105380638]$

objective value = -0.5286

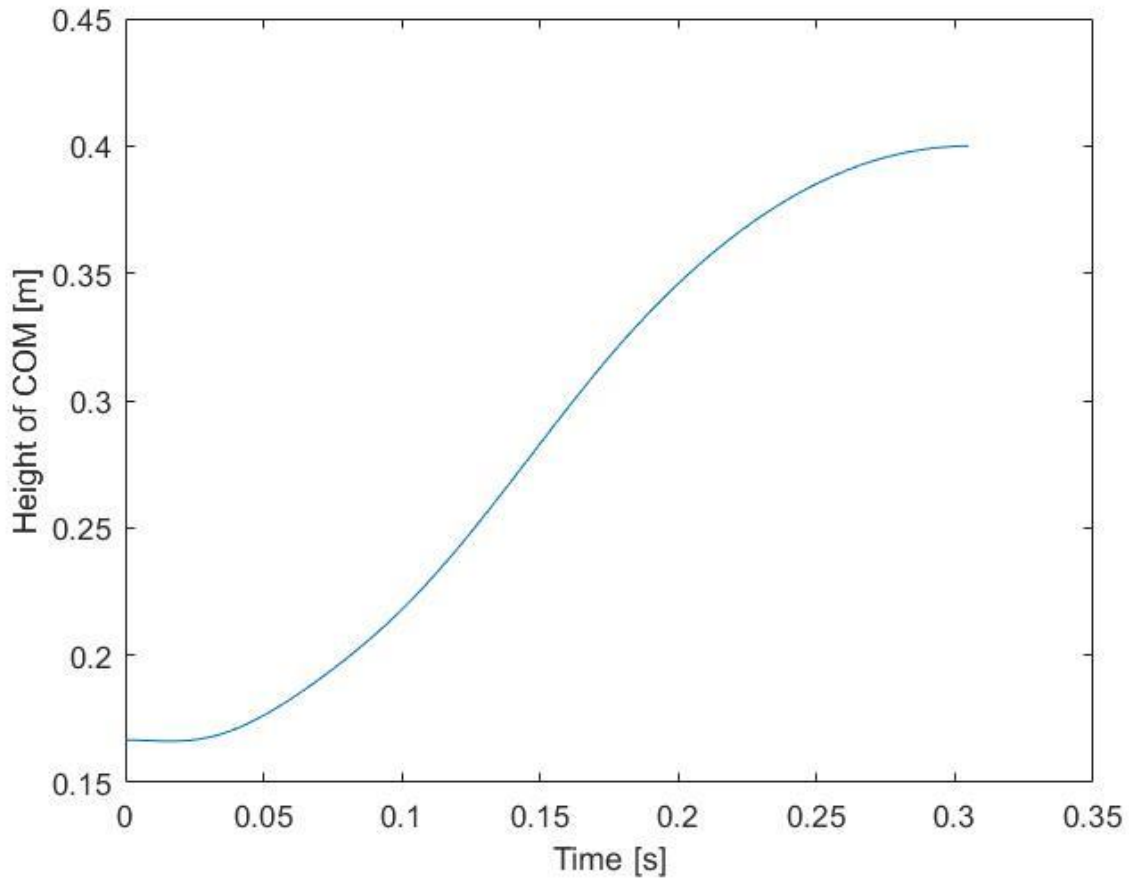
### 1.3.5 Minimum Time to 0.4 m

Initial guess:

$t_f = 0.5$

$\text{ctrl}.t_f = 0.4$

$\text{ctrl}.T = [1.5 \ 1.5 \ 1.5]$



Final values:

$t_f = 0.304959609169827$

$\text{ctrl}.t_f = 0.172827822046896$

$\text{ctrl}.T = [1.99998840345007 \quad 1.99998078052077 \quad 0.390695202451666]$

objective value = 0.3050

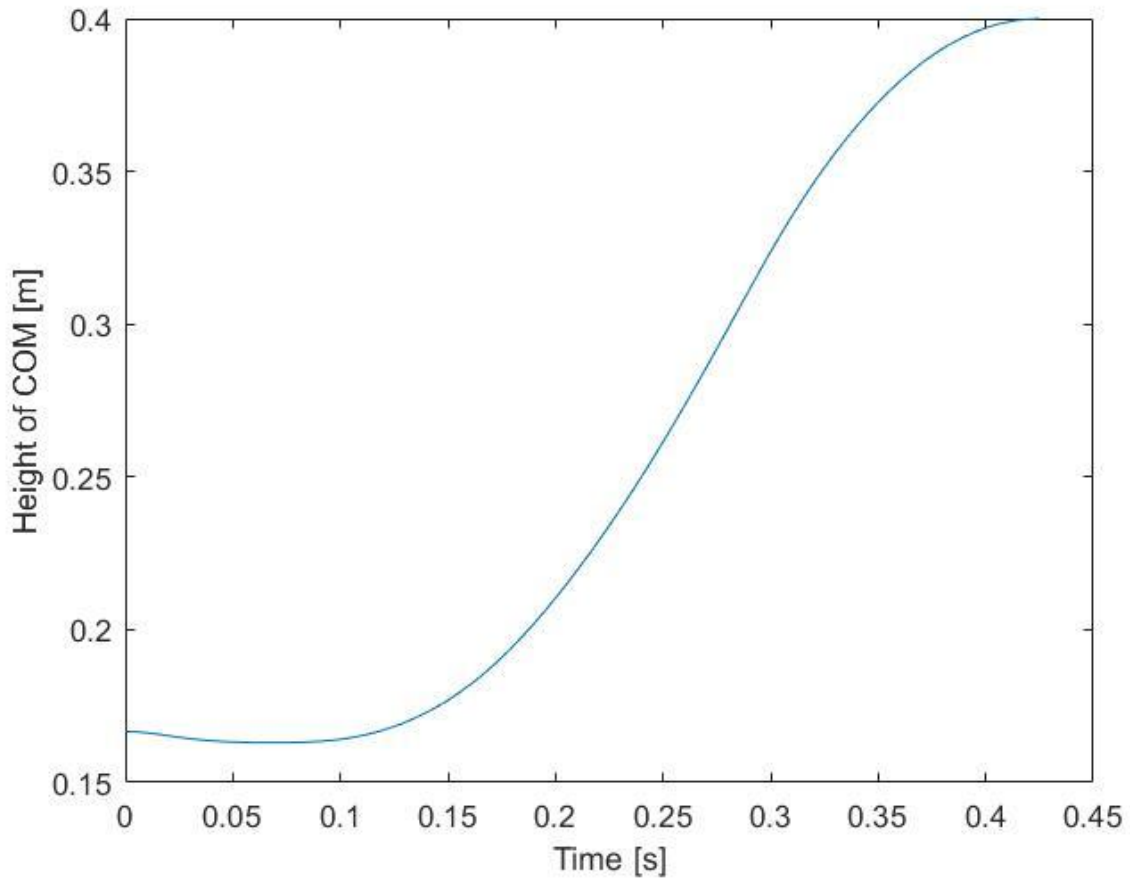
### 1.3.5 Minimum Energy

Initial guess:

$t_f = 0.5$

$\text{ctrl}.t_f = 0.4$

$\text{ctrl}.T = [1.5 \ 1.5 \ 1.5]$



Final values:

$t_f = 0.424724793772440$

$\text{ctrl}.t_f = 0.300935135789384$

$\text{ctrl}.T = [0.555972754971973 \quad 1.79426323042252 \quad 0.869050049443244]$

objective value = 0.8897