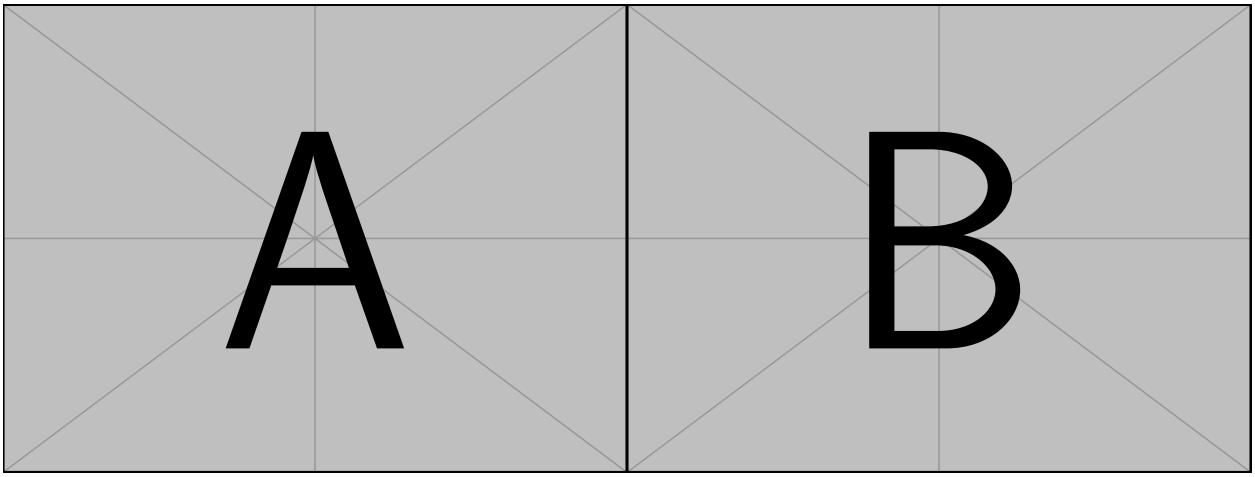
# Useful Overleaf Patterns

Ellis, Zack

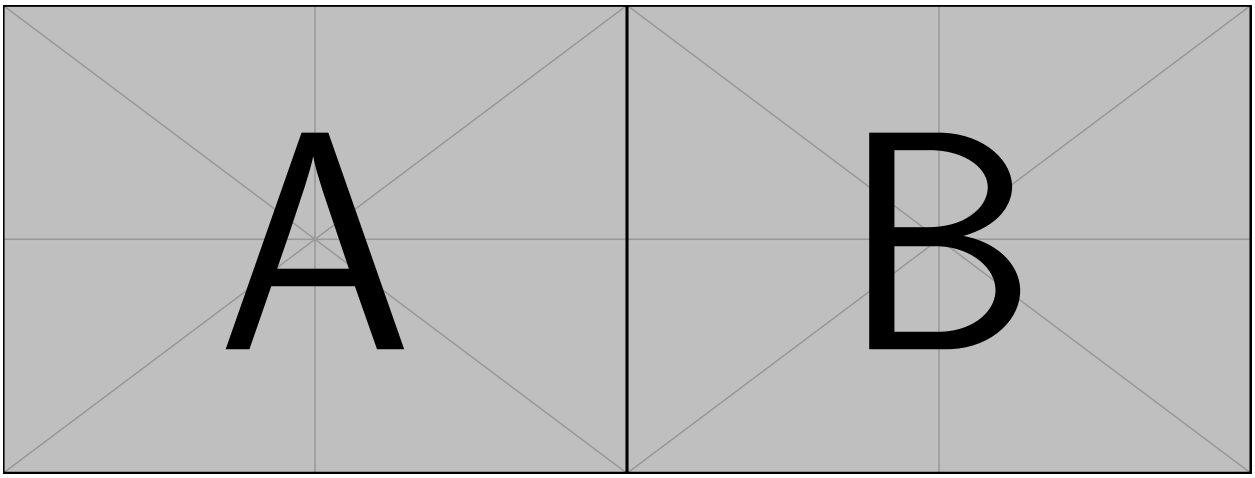
Another Author

## Figures and Subfigures

Can split figures with multiple subfigures across pages while retaining the caption using `\ContinuedFloat`:

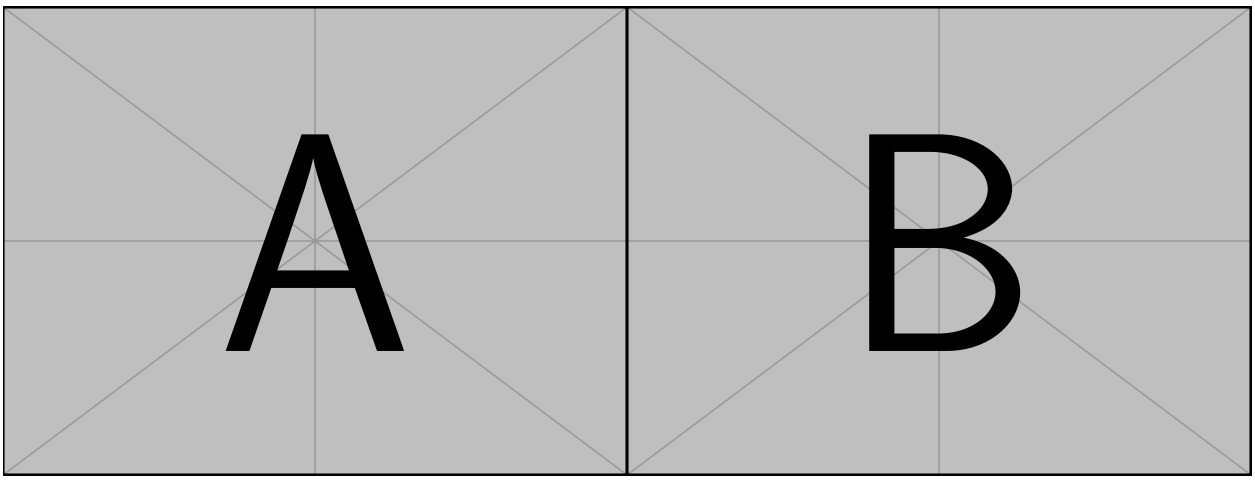



**(a) Inertial Velocity in Body Frame** **(b) Angular Velocity**




**(c) Control Inputs** **(d) 3D Position**

**Fig. 1 Simulation 1 Results**




**(e) Inertial Position** **(f) Euler Angles**

**Fig. 1 (cont.) Simulation 1 Results**

## Random Things

Can use `\sfrac{}{}` from the xfrac package (see line 21) to create $^{diagonal}/_{fractions}$. Good for condensing units from $\frac{m}{s}$ to $^{m}/_{s}$.

Use the gensymb package (see line 23) to use symbols like °with `\degree`.

## Vectors, Matrices, and Equations

Create vectors like this:

$$\vec{x_0} = \begin{bmatrix} 0\ m, & 0\ m, & -1609.34\ m, & 0°, & 0°, & 0°, & 21\ ^{m}/_{s}, & 0\ ^{m}/_{s}, & 0\ ^{m}/_{s}, & 0\ ^{deg}/_{s}, & 0\ ^{deg}/_{s}, & 0\ ^{deg}/_{s} \end{bmatrix}^T$$

Equations like this:

$$x_{long\ subscript} = 3 * \pi^{long\ superscript} \tag{1}$$

Un-numbered using an *:

$$x = 3 * \pi^2$$

## MATLAB Code

Can reference a function `likeThis()` by using `\verb`.

To insert MATLAB code, use `lstlisting`:

```
1  function answer = MATLABFunction(input1, input2)
2  % This isn't a real function
3  % uh
4
5  % do some math
6  an = input1 * eye(3, 3);
7
8  % more math
9  swer = input2 * ones(3, 3);
10
11 % find answer
12 answer = an + swer;
```

From the free-body diagram, the equation of motion:

$$= mg - F_D = ma \tag{2}$$

Rearranging and expanding the drag force term, we see that:

$$-ma - \left[\frac{C_D A \rho(x)}{2}\right] V^2 + mg = 0$$