Data Science: Introduction

MIE223

Winter 2025

1 Introduction

1.1 Data Science

Check out this screenshot:

```
%Path relative to the main .tex file
\graphicspath{ {./images/} }
```

```
    print("Hello World!")
```

Note 1. Capital Letters refer to the accelerating reference frame *S* while lowercase letters refer to the inertial reference frame S_0

Picture a moving reference frame, *S*, moving relative to S_0. Imagine in the the moving reference frame that a ball with mass, *m* is being thrown. In order to consider the motion of the ball, the motion must be first considered in the inertial reference frame.

$$F = m\ddot{r_0} \tag{1}$$

Where r_0 is the ball's position relative to S_0.

Now, by considering the motion of the ball in the accelerating frame, the ball position relative to *S* is *R*. (It's velocity is $\dot{R}$. Thus, relating *R* to r_0, we have:

$$\dot{r_0} = \dot{R} + V \tag{2}$$

Newton's second law for the inertial reference frame by differentiate and multiplying by mass is:

$$F_{\text{inertial}} = -mA = -m\ddot{R} \tag{3}$$

1.2 The Tides

The Tidal Force

$$F_{tide} = -GM_m m(\frac{\hat{d}}{d^2} - \frac{\hat{d_0}}{d_0^2}) \tag{4}$$

Where:

$G =$ Gravitational Constant
$d =$ Object's Position Relative to Moon
$d_0 =$ Earth's Center Relative to the moon
$M_m =$ Mass of the moon