

# Introduction

## Dynamic Core of Double Pendulum in Python

```
class DoublePendulum:  
    """  
    Create a double pendulum object.  
    """  
  
    def __init__(self,  
                 l1: float,  
                 l2: float,  
                 m1: float,  
                 m2: float,  
                 theta1: float = 0,  
                 theta2: float = 0,  
                 theta1dot: float = 0,  
                 theta2dot: float = 0,  
                 ...)
```

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## Dynamic Core of Double Pendulum in Python

```
def __integrate(self, dt: float) -> None:
```

.....

依據雙擺當前的狀態，對該雙擺進行單一時步的積分。

Args - dt(float):時步步長。

.....

```
theta1dotdot = ((m2*g*sin(theta2)*cos(theta1-theta2))-(m2*sin(theta1-theta2)
*(l1*theta1dot*theta1dot*cos(theta1-theta2)+l2*theta2dot*theta2dot))-((m1+m2)
*g*sin(theta1)))/(l1*(m1+m2*(sin2(theta1-theta2))))
```

```
theta2dotdot = (((m1+m2)*(l1*theta1dot*theta1dot*sin(theta1-theta2)-g*
sin(theta2)+g*sin(theta1)*cos(theta1-theta2))+(m2*l2*theta2dot*theta2dot*
sin(theta1-theta2)*cos(theta1-theta2)))/(l2*(m1+m2*(sin2(theta1-theta2))))
```

```
theta1dot = theta1dot + theta1dotdot*dt
```

```
theta2dot = theta2dot + theta2dotdot*dt
```

```
theta1 = theta1 + theta1dot*dt
```

```
theta2 = theta2 + theta2dot*dt
```

....