```
import sympy
sympy.init_printing()

from dimensional_analysis import (parameter, dimensional_analysis,
                                  solve_from_dimensional_analysis,
                                  standard_dimensional_analysis,
                                  solve_from_standard_dimensional_analysis)
```

Manual Dimensional Analysis

```
density = parameter('density', 'kg m^-3', '\\rho')
viscosity = parameter('viscosity', 'kg m^-1 s^-1', '\mu')
velocity = parameter('velocity', 'm s^-1', 'u')
diameter = parameter('diameter', 'm', 'D')
```

```
dimensional_analysis(density, viscosity, velocity, diameter)
```

$$\left\{\Pi_0 : \frac{\rho D u}{\mu}\right\}$$

```
solve_from_dimensional_analysis(density, viscosity, velocity, diameter,
target_parameter=velocity)
```

$$\left\{\Pi_0 : \left[\frac{\Pi_0 \mu}{\rho D}\right]\right\}$$

Automated Standard Dimensional Analysis

Kinetic Energy

```
standard_dimensional_analysis('kinetic_energy mass velocity')
```

$$\left\{\Pi_0 : \frac{\sqrt{m} v}{\sqrt{KE}}\right\}$$

```
solve_from_standard_dimensional_analysis('kinetic_energy mass velocity', 'mass')
```

$$\left\{\Pi_0 : \left[\frac{\Pi_0^2 KE}{v^2}\right]\right\}$$

Fluid Flow

```
standard_dimensional_analysis('density viscosity velocity diameter')
```

$$\left\{\Pi_0 : \frac{\rho D v}{\mu}\right\}$$

Pendulum

```
standard_dimensional_analysis('period g length')
```

$$\left\{\Pi_0 : \frac{L}{T^2 g}\right\}$$

Fluid Static

```
standard_dimensional_analysis('pressure density g height')
```

$$\left\{\Pi_0 : \frac{\rho h g}{P}\right\}$$

Wave Equation

```
standard_dimensional_analysis('wave_length velocity period')
```

$$\left\{\Pi_0 : \frac{T v}{\lambda}\right\}$$

Magnetic Force

```
standard_dimensional_analysis('magnetic_field force electric_current length')
```

$$\left\{\Pi_0 : \frac{ILB}{F}\right\}$$

```
solve_from_standard_dimensional_analysis('magnetic_field force electric_current
length', 'force')
```

$$\left\{\Pi_0 : \left[\frac{ILB}{\Pi_0}\right]\right\}$$