Oaktree Manual

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Input

Oaktree input language extends Python. Subroutines and objects related to input processing are listed below.

4.1 SIMULATION

SIMULATION object stores data specific to one distinct analysis.

obj = SIMULATION (outpath, duration, step, grid, cutoff)

- **obj** - SIMULATION object
- **outpath** - output directory path
- **duration** - simulation duration
- **step** - time step
- **grid** - regular size of octree grid
- **cutoff** - cutoff length below which geometrical details are not resolved

4.2 MATERIAL

MATERIAL associates a volume color with a solid material.

MATERIAL (simu, vcolor, density, young, poisson)

- **simu** - simulation for which the material is defined
- **vcolor** - volume color to which the material applies
- **density** - mass density
- **young** - Young's modulus
- **poisson** - Poisson's ratio

4.3 INTERFACE

INTERFACE defines contact properties between a pair of surfaces.

INTERFACE (simu, scolor1, scolor2, friction, restitution)

- **simu** - simulation for which the interface is defined
- **scolor1** - first surface color
- **scolor2** - second surface color
- **friction** - friction coefficient
- **restitution** - impact restitution

4.4 SUPERELLIPSOID

A superellipsoid is defined by the zero set of the implicit function

$$F(x,y,z) = \left(\left|\frac{x}{a}\right|^p + \left|\frac{y}{b}\right|^p\right)^{q/p} + \left|\frac{z}{c}\right|^q - 1.$$

This routine creates a translated superellipsoid in an initial orientation aligned with the global frame.

obj = SUPERELLIPSOID (center, radii, r, t, vcolor, scolor)

- **obj** - SHAPE object
- **center** - tuple (x, y, z) defining the center
- **radii** - tuple (a, b, c) defining the radii
- **p** - exponent p
- **q** - exponent q
- **vcolor** - integer volume color
- **scolor** - integer surface color

4.5 SPHERE

A sphere shape.

obj = SPHERE (center, r, vcolor, scolor)

- **obj** - SHAPE object
- **center** - tuple (x, y, z) defining the center
- **r** - radius
- **vcolor** - integer volume color
- **scolor** - integer surface color

4.6 CYLINDER

A cylinder shape.

obj = CYLINDER (base, direc, r, h, vcolor, scolor)

- **obj** - SHAPE object
- **base** - tuple (x, y, z) defining the base center
- **direc** - tuple (u, v, w) defining the direction
- **r** - radius
- **h** - height
- **vcolor** - integer volume color
- **scolor** - integer tuple $(s_{base}, s_{side}, s_{top})$of surface colors

4.7 CUBE

A cube shape.

obj = CUBE (corner, u, v, w, vcolor, scolor)

- **obj** - SHAPE object
- **corner** - tuple (x, y, z) defining the minimum coordinate corner
- **u** - length along x
- **v** - length along y
- **w** - length along z
- **vcolor** - integer volume color
- **scolor** - integer tuple $(s_{xmin}, s_{xmax}, s_{ymin}, s_{ymax}, s_{zmin}, s_{zmax})$of surface colors

4.8 UNION

Set theoretic union of two shapes.

obj = UNION (shape1, shape2)

- **obj** - SHAPE object
- **shape1** - first input SHAPE object
- **shape2** - second input SHAPE object

4.9 INTERSECTION

Set theoretic intersection of two shapes.

obj = INTERSECTION (shape1, shape2)

- **obj** - SHAPE object
- **shape1** - first input SHAPE object
- **shape2** - second input SHAPE object

4.10 DIFFERENCE

Set theoretic difference of two shapes.

obj = DIFFERENCE (shape1, shape2)

- **obj** - SHAPE object
- **shape1** - first input SHAPE object
- **shape2** - second input SHAPE object

4.11 MOVE

Move shape linearly.

MOVE (shape, vector)

- **shape** - input SHAPE object
- **vector** - tuple (u, v, w) defining the translation

4.12 ROTATE

Rotate shape about an axis.

MOVE (shape, point, vector, angle)

- **shape** - input SHAPE object
- **point** - tuple (x, y, z) defining axis point
- **vector** - tuple (u, v, w) defining axis direction
- **angle** - oriented angle in degrees

4.13 RIGID

Rigid body is created in a simulation.

obj = RIGID (simu, shape, label)

- **obj** - BODY object
- **simu** - simulation in which the body is created
- **shape** - body shape
- **label** - body label

4.14 DEFORMABLE

Deformable body is created in a simulation.

obj = DEFORMABLE (simu, shape, label)

- **obj** - BODY object
- **simu** - simulation in which the body is created
- **shape** - body shape
- **label** - body label

4.15 FIX

Fix surface.

FIX (body, scolor)

- **body** - BODY object
- **scolor** - surface to fix

4.16 VELOCITY

Prescribe normal surface velocity

VELOCITY (body, scolor, pressure)

- **body** - BODY object
- **scolor** - surface to prescribe velocity to
- **pressure** - constant value or Python function: *value = pressure (time)*

4.17 PRESSURE

Define surface pressure.

PRESSURE (body, scolor, pressure)

- **body** - BODY object
- **scolor** - surface to apply pressure
- **pressure** - constant value or Python function: *value = pressure (time)*

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