

# User Manual 4.0 Parallelepipeds

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### Definition

The parallelepipeds are rectangles defined in a 3D space by their centre and a local orthogonal frame (U, V, W).

- The normalized U vector defines the "length" direction
- The normalized V vector defines the "width" direction
- The normalized W vector defines the "height" direction

The four corners and faces can be retrieved in the following orders :



### Implementation

The Parallelepiped object implements the [SolidShape interface](#). Please refer to the [Parallelepiped javadoc](#) for a complete list of public methods.

### Instantiation

The parallelepiped object is built from a centre (Vector3D), two vectors (Vector3D) to describe its orientation, and three dimensions :

```
Vector3D center = new Vector3D(1.0, 1.0, 1.0);
Vector3D uVector = new Vector3D(1.0, 1.0, 0.0);
Vector3D inputvVector = new Vector3D(-5.0, 1.0, 0.0);
Parallelepipedparallelepiped= new Parallelepiped(center, uVector,
inputvVector, 4.0, 6.0, 2.0);
```

The local frame of the plate is build from the two orientation vector :

- U is the first once normalized (uVector)
- V is the vector computed to be orthogonal to U in the plane define by the two given vectors, in the direction of inputvVector.
- W is computed by cross product of U and V

## Usage

Please refer to the [MAT\_GEO\_Home#HInteractions Interactions with other geometrical objects section] for methods inherited from the Shape interface.

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