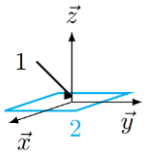
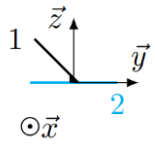
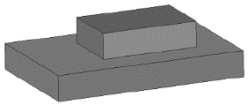
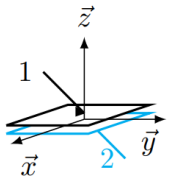
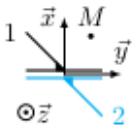
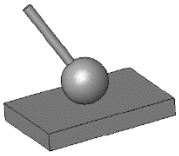
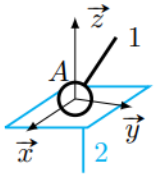
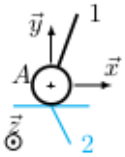
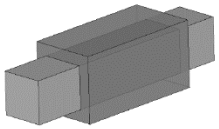
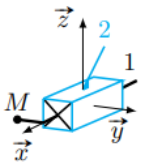
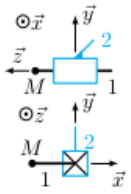
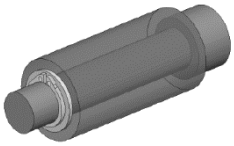
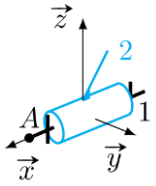
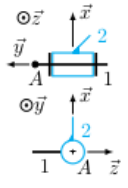
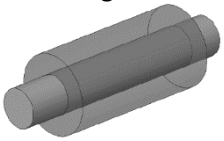
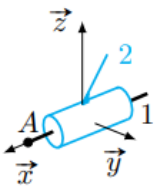
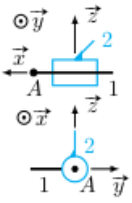
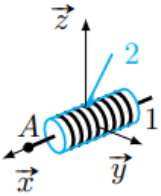
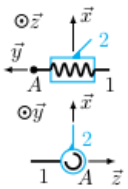
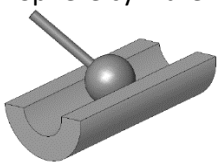
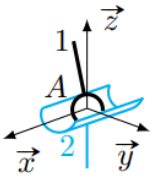
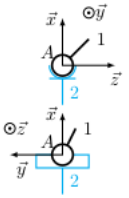
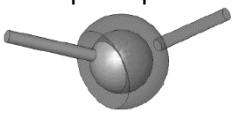
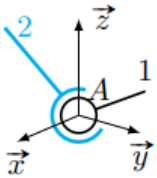
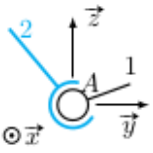
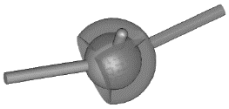
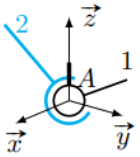
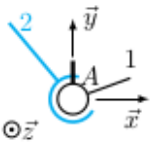
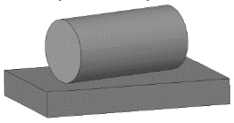
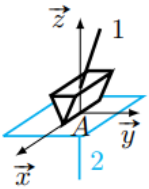
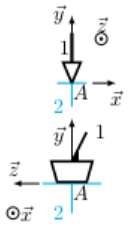
Liaisons normalisées

Pour caractériser complètement les liaisons, on définit un repère local à partir des caractéristiques géométriques des contacts (point, droite, centre, axe, normale...). Ce repère est ensuite associé à chaque solide. On détermine alors les degrés de liberté autorisés entre les solides (d'un repère par rapport à l'autre) sans changer la nature du contact.

Nom de la liaison	Caractéristiques géométriques	Degrés de liberté	Schéma spatial (3D)	Schéma(s) plan(s) (2D)	Mouvements possibles
Encastrement		0 DDL			$\begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}$
Appui plan 	De normal $\vec{z}$ (Orthogonal au plan)	3 DDL			$\begin{Bmatrix} 0 & V_x \\ 0 & V_y \\ \omega_z & 0 \end{Bmatrix}$
Sphère plan 	De normal $(A,\vec{z})$ (Contact en A et orthogonal au plan)	5 DDL			$\begin{Bmatrix} \omega_x & V_x \\ \omega_y & V_y \\ \omega_z & 0 \end{Bmatrix}$
Glissière 	De direction $\vec{x}$	1 DDL			$\begin{Bmatrix} 0 & V_x \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}$
Pivot 	D'axe $(A,\vec{x})$	1 DDL			$\begin{Bmatrix} \omega_x & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}$
Pivot glissant 	D'axe $(A,\vec{x})$	2 DDL			$\begin{Bmatrix} \omega_x & V_x \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}$
Hélicoïdale 	D'axe $(A,\vec{x})$	1 DDL			$\begin{Bmatrix} \omega_x & V_x \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}$ $\omega_x = \frac{2\pi V_x}{p}$ avec p le pas

Nom de la liaison	Caractéristiques géométriques	Degrés de liberté	Schéma spatial (3D)	Schéma(s) plan(s) (2D)	Mouvements possibles
Sphère cylindre 	D'axe $(A,\vec{x})$ A centre de la sphère	4 DDL			$\begin{Bmatrix} \omega_x & V_x \\ \omega_y & 0 \\ \omega_z & 0 \end{Bmatrix}$
Sphérique 	De centre A Centre de la sphère	3 DDL			$\begin{Bmatrix} \omega_x & 0 \\ \omega_y & 0 \\ \omega_z & 0 \end{Bmatrix}$
Sphérique à doigt 	De centre A, de normal au plan de rainurage $\vec{x}$ et de direction du doigt $\vec{z}$	2 DDL			$\begin{Bmatrix} \omega_x & 0 \\ 0 & 0 \\ \omega_z & 0 \end{Bmatrix}$
Cylindre plan 	D'axe $(A,\vec{x})$ et de normal $\vec{z}$	4 DDL			$\begin{Bmatrix} \omega_x & V_x \\ 0 & V_y \\ \omega_z & 0 \end{Bmatrix}$

Le **nombre de degrés de liberté** d'une liaison entre deux solides est le **nombre de mouvements relatifs indépendants** que la liaison autorise entre ces deux solides **sans changer la nature du contact**. Ce nombre est égal au plus à 6. S'il est égal à 0, la liaison est appelée liaison encastrement. S'il est égal à 6 la liaison est dite libre. Les liaisons du tableau précédent ont été retenues par l'AFNOR et sont définies par leurs éléments géométriques. Il est alors aisé d'en déduire les degrés de liberté.