Plot af parametriserede mængder

1D-kurve i 2D (planen)

Eksempel i MATH-mode

```
> restart;
```

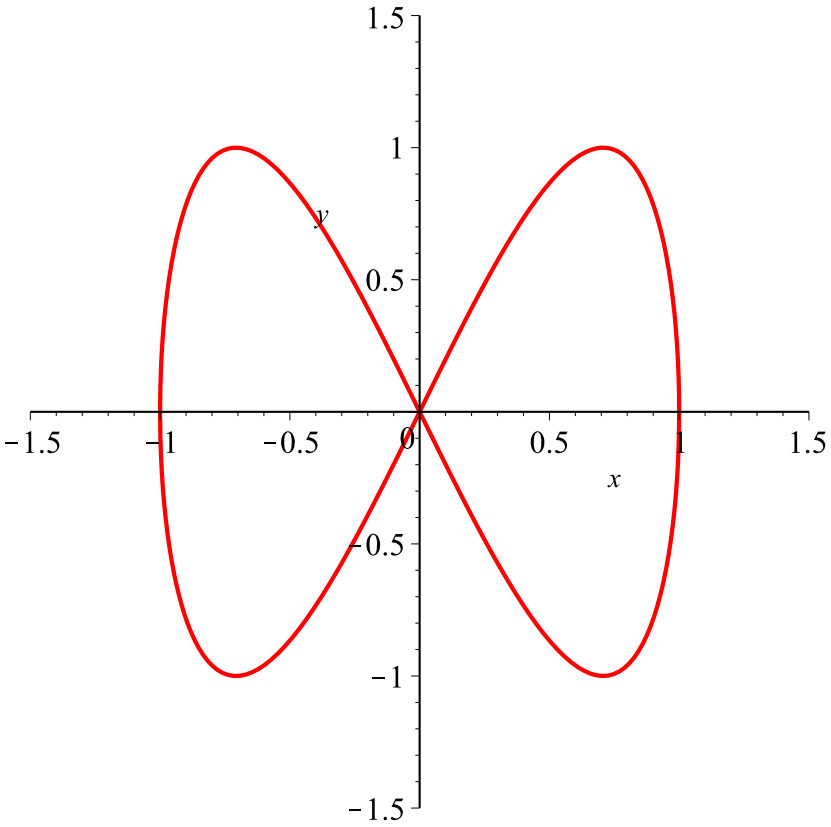
Kurven er givet ved 1 parameter: u.

```
> r := u → ⟨cos(u), sin(2 u)⟩ : r(u);
  u ∈ [0, 2·π];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2\,u) \end{bmatrix}$$

$$u \in [0, 2\,\pi] \tag{1.1}$$

```
> plot([r(u)[1], r(u)[2], u = 0..2·π], labels = [x, y], view = [-1.5..1.5, -1.5..1.5], thickness = 2,
      color = red);
```



Eksempel i TEXT-mode

```
> restart;
```

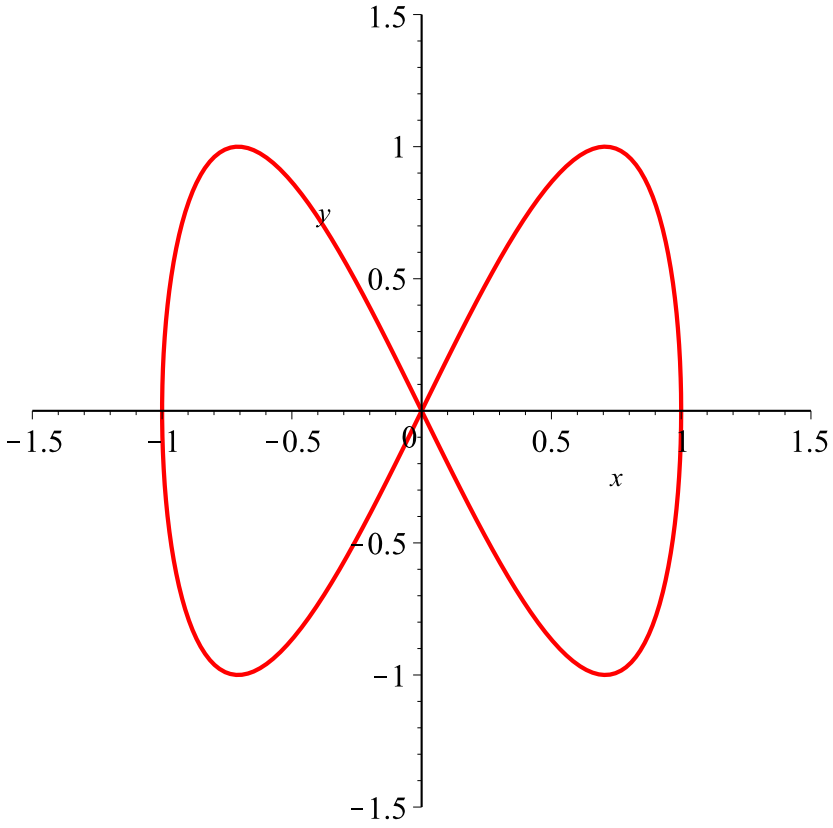
Kurven er givet ved 1 parameter: u.

```
> r := u-><cos(u),sin(2*u)>:r(u);
  u in [0,2];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2\,u) \end{bmatrix}$$

$$u \in [0, 2] \qquad \textbf{(1.2)}$$

```
> plot([r(u)[1], r(u)[2], u = 0 .. 2*Pi], labels = [x, y], view =
  [-1.5 .. 1.5, -1.5 .. 1.5], thickness = 2,color=red);
```



2D-område i 2D (planen)

Eksempel i MATH-mode

```
> restart;
```

Området er givet ved 2 parametre: u og v.

```
> r := (u, v) -> <v·cos(u), v·sin(u)> : r(u, v);
```

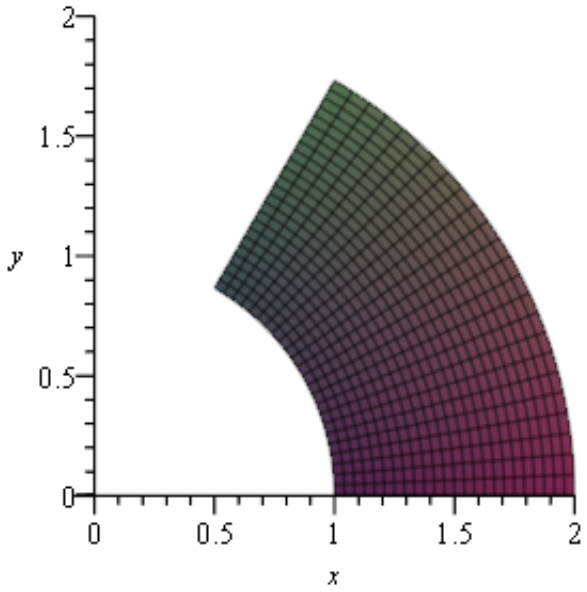
$$u \in \left[0, \frac{\pi}{3}\right]; v \in [1, 2];$$

$$\begin{bmatrix} v\cos(u) \\ v\sin(u) \end{bmatrix}$$

$$u \in \left[0, \frac{1}{3}\pi\right]$$

$$v \in [1, 2] \qquad \textbf{(2.1)}$$

```
> plot3d( <r(u, v)[1], r(u, v)[2], 0>, u = 0 .. Pi/3, v = 1 ..2, labels = [x, y, " "], axes = normal,
    orientation = [ -90, 0 ], view = [ 0 ..2, 0 ..2, -2 ..2 ] );
```



Eksempel i TEXT-mode

Området er givet ved 2 parametre: *u* og *v*.

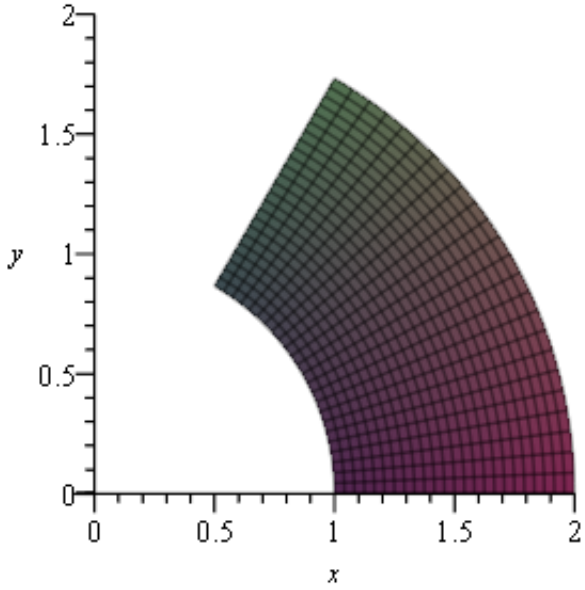
```
> restart;
> r := (u, v)-><v*cos(u), v*sin(u)>: r(u, v);
  u in [0, (1/3)*Pi]; v in [1, 2];
```

$$\begin{bmatrix} v\cos(u) \\ v\sin(u) \end{bmatrix}$$

$$u \in \left[0, \frac{1}{3}\pi\right]$$

$$v \in [1, 2] \qquad \textbf{(2.2)}$$

```
> plot3d(<r(u, v)[1], r(u, v)[2], 0>, u = 0 .. (1/3)*Pi, v = 1 ..
  2, labels = [x, y, " "], axes = normal, orientation = [-90, 0],
  view = [0 .. 2, 0 .. 2, -2 .. 2]);
```



1D-kurve i 3D (rummet)

Eksempel i MATH-mode

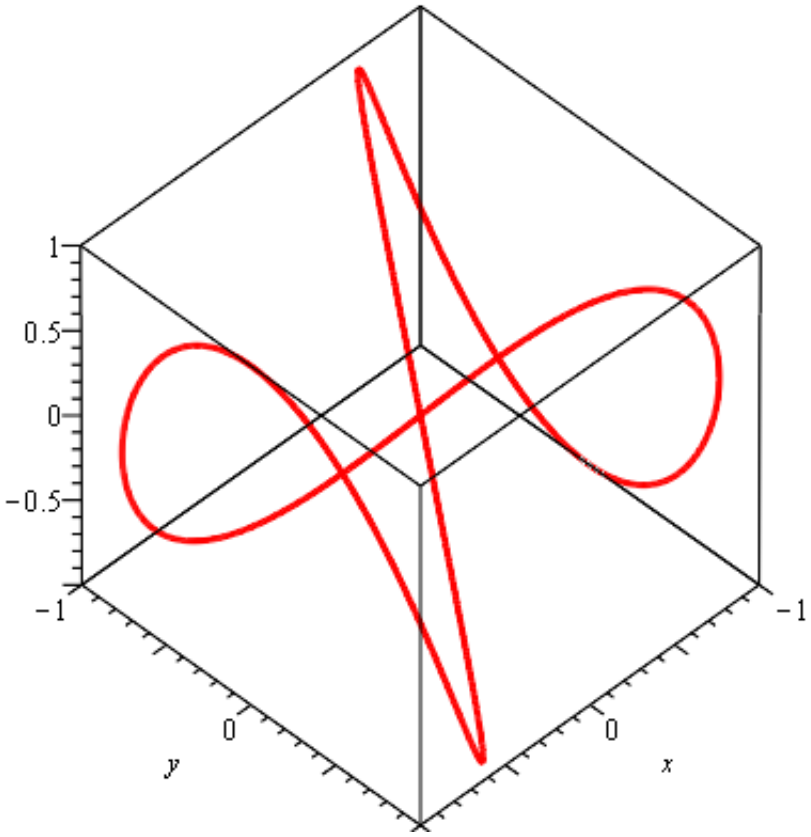
Kurven er givet ved 1 parameter: u.

```
> restart;
> r := u→⟨cos(u), sin(2·u), cos(3·u)⟩ : r(u);
  u ∈ [0, 2·π];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2\,u) \\ \cos(3\,u) \end{bmatrix}$$

$$u \in [0, 2\,\pi] \qquad \textbf{(3.1)}$$

```
> with(plots):
> spacecurve(r(u), u=0..2·π, axes=box, labels=[x, y, z], thickness=3, view=[-1..1, -1..1,
      -1..1], color=red, numpoints=1000);
```



Eksempel i TEXT-mode

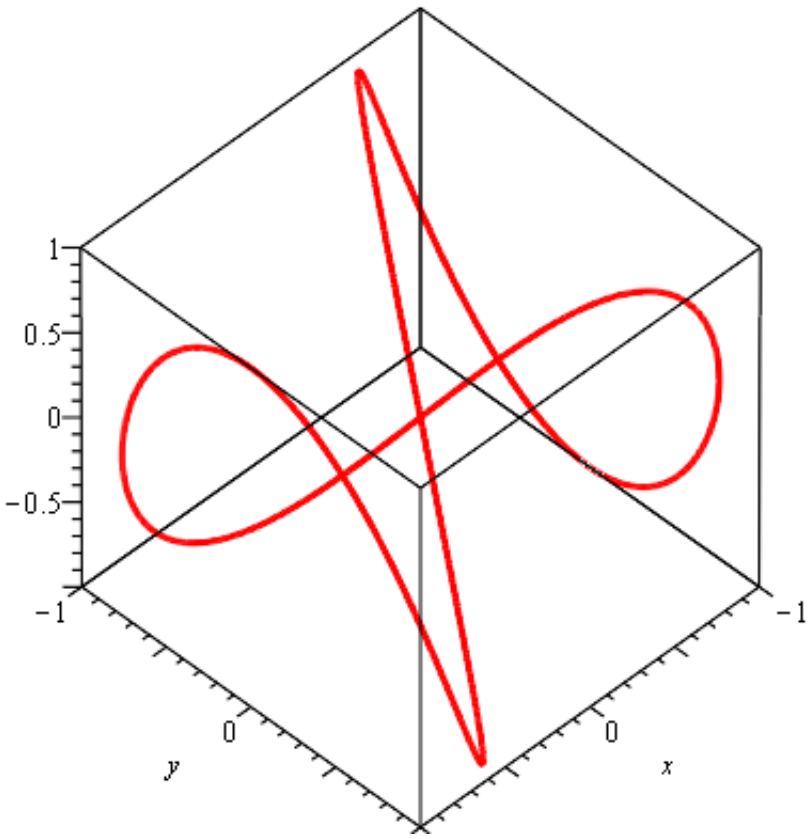
Kurven er givet ved 1 parameter: u.

```
> restart;
> r := u -><cos(u), sin(2*u), cos(3*u)>: r(u);
  u in [0, 2*Pi];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2\,u) \\ \cos(3\,u) \end{bmatrix}$$

$$u \in [0, 2\,\pi] \qquad \textbf{(3.2)}$$

```
> with(plots):
> spacecurve(r(u), u = 0 .. 2*Pi, axes = box, labels = [x, y, z],
  thickness = 3, view = [-1 .. 1, -1 .. 1, -1 .. 1], color = red,
  numpoints = 1000);
```



2D-flade i 3D (rummet)

Eksempel i MATH-mode

Fladen er givet ved 2 parametre: u og v.

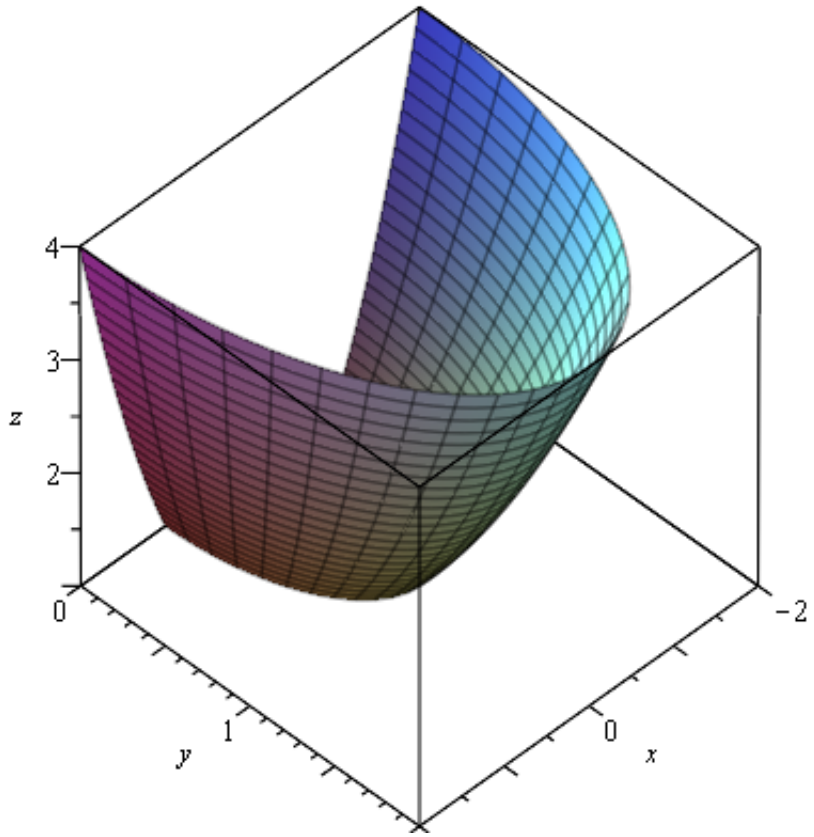
```
> restart;
> r := (u, v) → ⟨v·cos(u), v·sin(u), v^2⟩ : r(u, v);
  u ∈ [0, π]; v ∈ [1, 2];
```

$$\begin{bmatrix} v\cos(u) \\ v\sin(u) \\ v^2 \end{bmatrix}$$

$$u \in [0, \pi]$$

$$v \in [1, 2] \tag{4.1}$$

```
> plot3d(r(u, v), u = 0 ..π, v = 1 ..2, axes = box, labels = [x, y, z]);
```



Eksempel i TEXT-mode

Fladen er givet ved 2 parametre: u og v.

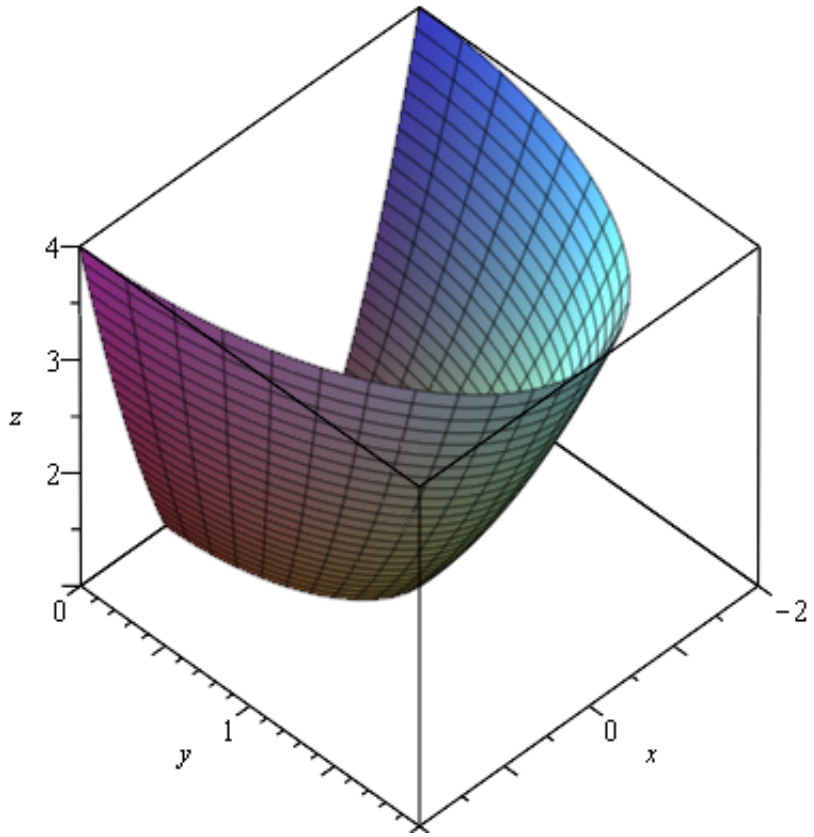
```
> restart;
> r := (u, v)-><v*cos(u), v*sin(u), v^2>: r(u, v);
  u in [0, Pi]; v in [1, 2];
```

$$\begin{bmatrix} v\cos(u) \\ v\sin(u) \\ v^2 \end{bmatrix}$$

$$u \in [0, \pi]$$

$$v \in [1, 2] \tag{4.2}$$

```
> plot3d(r(u, v), u = 0 .. Pi, v = 1 .. 2, axes = box, labels =
  [x, y, z]);
```



3D-område i 3D (rummet)

Eksempel i MATH-mode

Området er givet ved 3 parametre: u, v *og* w.

∈

```
> restart;
```

```
> r := (u, v, w) → ⟨sin(u), cos(u) + v, w·u/2⟩ : r(u, v, w);
```

$u \in [0, 2\cdot\pi], v \in [0, 1], w \in [0, 1];$

$$\begin{bmatrix} \sin(u) \\ \cos(u) + v \\ \frac{1}{2} w u \end{bmatrix}$$

$$u \in [0, 2\pi], v \in [0, 1], w \in [0, 1] \qquad \textbf{(5.1)}$$

```
> with(plots) :
> with(Integrator8) :
```

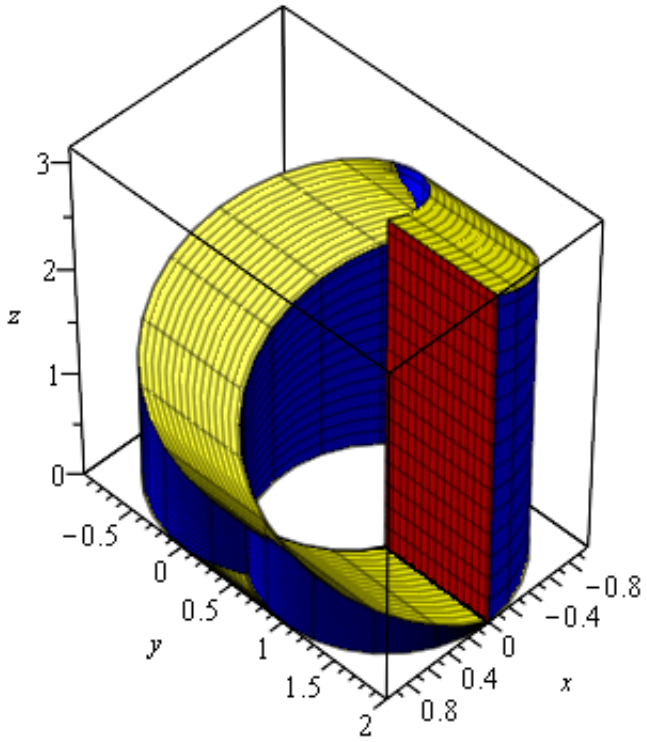
```
> B := [0, 2·π, 0, 1, 0, 1];
```

$$B := [0, 2\,\pi, 0, 1, 0, 1] \tag{5.2}$$

```
> net := [10, 10, 10];
```

$$net := [10, 10, 10] \tag{5.3}$$

```
> plot1 := Integrator8[sideFlader](r, B, net) :
> display(plot1, axes = box, labels = [x, y, z]);
```



Eksempel i TEXT-mode

Området er givet ved 3 parametre: *u*, *v* og w.

```
> restart;
> r := (u, v, w) -> <sin(u), cos(u)+v, (1/2)*w*u>: r(u, v, w);
  u in [0, 2*Pi], v in [0, 1], w in [0, 1];
```

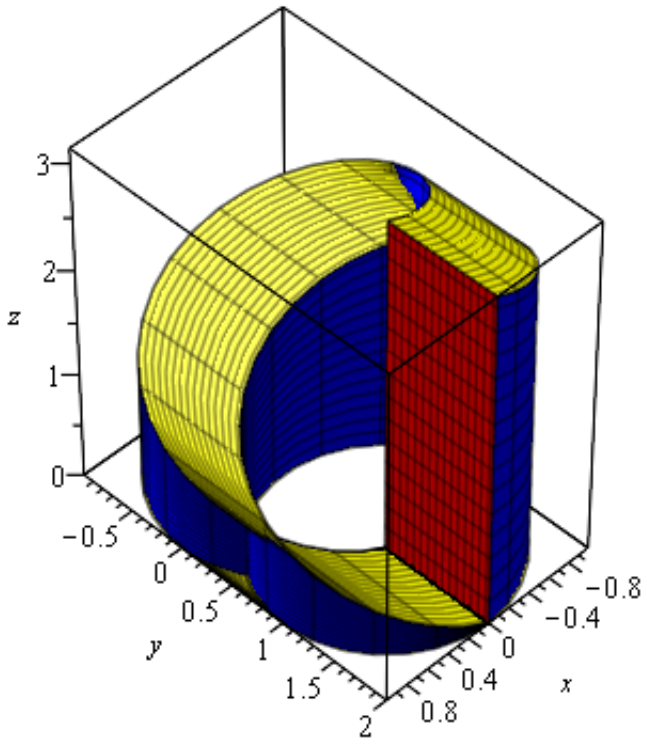
$$\begin{bmatrix} \sin(u) \\ \cos(u) + v \\ \frac{1}{2}\, w\, u \end{bmatrix}$$

$$u \in [0, 2\,\pi], v \in [0, 1], w \in [0, 1] \tag{5.4}$$

```
> with(plots):
> with(Integrator8):
> B := [0, 2*Pi, 0, 1, 0, 1];
```

$$B := [0, 2\,\pi, 0, 1, 0, 1] \tag{5.5}$$

```
> net := [10, 10, 10];
```

$$net := [10, 10, 10] \tag{5.6}$$

```
> plot1 := Integrator8[sideFlader](r, B, net):
> display(plot1, axes = box, labels = [x, y, z]);
```