```
> with(VectorCalculus) : SetCoordinates(cartesian[x, y, z]) :
> r := sqrt(x² + y²) :
```

$$
> v\_inside := VectorField\left(\left[-\frac{alpha \cdot y}{r0^2}, \frac{alpha \cdot x}{r0^2}, 0\right]\right) :
$$

```
> simplify(Curl(v_inside))
```

$$(0)\bar{e}_x + (0)\bar{e}_y + \left(\frac{2\,\alpha}{r0^2}\right)\bar{e}_z \tag{1}$$

$$
> v\_outside := VectorField\left(\left[-\frac{alpha \cdot y}{r^2}, \frac{alpha \cdot x}{r^2}, 0\right]\right) :
$$

```
> simplify(Curl(v_outside))
```

$$(0)\bar{e}_x + (0)\bar{e}_y + (0)\bar{e}_z \tag{2}$$

```
> # IV
> circle := [r*cos(theta), r*sin(theta), 0] :
> dr := VectorField([diff(circle[1], theta), diff(circle[2], theta), 0])
```

$$dr := \left(-\sqrt{x^2 + y^2}\,\sin(\theta)\right)\bar{e}_x + \left(\sqrt{x^2 + y^2}\,\cos(\theta)\right)\bar{e}_y + (0)\bar{e}_z \tag{3}$$

```
> v_circle := eval(v_outside . dr, [x = circle[1], y = circle[2]])
```

$$
v\_circle := \frac{\alpha\sqrt{x^2 + y^2}\,\sin(\theta)^2}{\sqrt{(x^2 + y^2)\cos(\theta)^2 + (x^2 + y^2)\sin(\theta)^2}}
$$
$$
+ \frac{\alpha\sqrt{x^2 + y^2}\,\cos(\theta)^2}{\sqrt{(x^2 + y^2)\cos(\theta)^2 + (x^2 + y^2)\sin(\theta)^2}} \tag{4}
$$

```
> int_ := int(v_circle, theta = 0..2·Pi)
```

$$int\_ := 2\,\pi\,\alpha \tag{5}$$

```
>
```