Differentialoperatoren in Zylinder- und Kugelkoordinaten

	Zylinderkoordinaten	Kugelkoordinaten
Differentieller Ortsvektor	$d\underline{r} = d\varrho\underline{e}_\varrho + \varrho d\varphi\underline{e}_\varphi + dz\underline{e}_z$	$d\underline{r} = dr\underline{e}_r + rd\theta\underline{e}_\theta + r\sin\theta d\varphi\underline{e}_\varphi$
Geschwindigkeit	$\dot{\underline{r}} = \dot{\varrho}\underline{e}_\varrho + \dot{\varphi}\varrho\underline{e}_\varphi + \dot{z}\underline{e}_z$	$\dot{\underline{r}} = \dot{r}\underline{e}_r + r\dot{\theta}\underline{e}_\theta + r\sin\theta\dot{\varphi}\underline{e}_\varphi$
Beschleunigung	$\ddot{\underline{r}} = \left(\ddot{\varrho} - \varrho\dot{\varphi}^2\right)\underline{e}_\varrho + \left(\ddot{\varphi}\varrho + 2\dot{\varphi}\dot{\varrho}\right)\underline{e}_\varrho + \ddot{z}\underline{e}_z$	$\ddot{\underline{r}} = \left(\ddot{r} - \dot{\theta}^2 r - \dot{\varphi}^2 r\sin^2\theta\right)\underline{e}_r$ $+ \left(\ddot{\theta}r + 2\dot{\theta}\dot{r} - \dot{\varphi}^2 r\cos\theta\sin\theta\right)\underline{e}_\theta$ $+ \left(\ddot{\varphi}r\sin\theta + 2\dot{\varphi}\dot{r}\sin\theta + 2\dot{\varphi}\dot{\theta}r\cos\theta\right)\underline{e}_\varphi$
Gradient	$\operatorname{grad} f = \partial_\varrho\underline{e}_\varrho + \frac{1}{\varrho}\partial_\varphi f\underline{e}_\varphi + \partial_z f\underline{e}_z$	$\operatorname{grad} f = \partial_r f\underline{e}_r + \frac{1}{r}\partial_\theta f\underline{e}_\theta + \frac{1}{r\sin\theta}\partial_\varphi f\underline{e}_\varphi$
Divergenz	$\operatorname{div}\underline{A} = \frac{1}{\varrho}\partial_\varrho\left(\varrho\hat{A}^\varrho\right) + \frac{1}{\varrho}\partial_\varphi\hat{A}^\varphi + \partial_z\hat{A}^z$	$\operatorname{div}\underline{A} = \frac{1}{r^2}\partial_r\left(r^2\hat{A}^r\right) + \frac{1}{r\sin\theta}\partial_\theta\left(\sin\theta\hat{A}^\theta\right) + \frac{1}{r\sin\theta}\partial_\varphi\hat{A}^\varphi$
Rotation	$(\operatorname{rot}\underline{A})_\varrho = \frac{1}{\varrho}\partial_\varphi\hat{A}_z - \partial_z\hat{A}_\varphi$	$(\operatorname{rot}\underline{A})_r = \frac{1}{r\sin\theta}\left\{\partial_\theta\left(\sin\theta\hat{A}_\varphi\right) - \partial_\varphi\hat{A}_\theta\right\}$
	$(\operatorname{rot}\underline{A})_\varphi = \partial_z\hat{A}_\varrho - \partial_\varrho\hat{A}_z$	$(\operatorname{rot}\underline{A})_\theta = \frac{1}{r\sin\theta}\partial_\varphi\hat{A}_r - \frac{1}{r}\partial_r\left(r\hat{A}_\varphi\right)$
	$(\operatorname{rot}\underline{A})_z = \frac{1}{\varrho}\partial_\varrho\left(\varrho\hat{A}_\varphi\right) - \frac{1}{\varrho}\partial_\varphi\hat{A}_\varrho$	$(\operatorname{rot}\underline{A})_\varphi = \frac{1}{r}\partial_r\left(r\hat{A}_\theta\right) - \frac{1}{r}\partial_\theta\hat{A}_r$
Laplaceoperator	$\Delta f = \frac{1}{\varrho}\partial_\varrho\left(\varrho\partial_\varrho f\right) + \frac{1}{\varrho^2}\partial_\varphi^2 f + \partial_z^2 f$	$\Delta f = \partial_r^2 f + \frac{2}{r}\partial_r f + \frac{1}{r^2}\partial_\theta^2 f + \frac{\cot\theta}{r^2}\partial_\theta f + \frac{1}{r^2\sin^2\theta}\partial_\varphi^2 f$