

Lösungen 1.Kurztest Gruppe A-D

- Bestimmen Sie ein (skalares) Potential zum Vektorfeld

$$\mathbf{a} = \begin{pmatrix} -y^{\xi_1} z^{\xi_2} \sin x + \zeta_1 x^{\zeta_1-1} y^{\zeta_2} \sin z \\ \xi_1 y^{\xi_1-1} z^{\xi_2} \cos x + \zeta_2 x^{\zeta_1} y^{\zeta_2-1} \sin z \\ \xi_2 y^{\xi_1} z^{\xi_2-1} \cos(x) + x^{\zeta_1} y^{\zeta_2} \cos z \end{pmatrix}$$

Lösung:

$$\begin{aligned} \frac{\partial}{\partial x} \Phi &\stackrel{!}{=} -y^{\xi_1} z^{\xi_2} \sin x + \zeta_1 x^{\zeta_1-1} y^{\zeta_2} \sin z \\ \Rightarrow \Phi(x, y, z) &= y^{\xi_1} z^{\xi_2} \cos x + x^{\zeta_1} y^{\zeta_2} \sin z + k(y, z) \\ \frac{\partial}{\partial y} \Phi &\stackrel{!}{=} \xi_1 y^{\xi_1-1} z^{\xi_2} \cos x + \zeta_2 x^{\zeta_1} y^{\zeta_2-1} \sin z \\ &= \xi_1 y^{\xi_1-1} z^{\xi_2} \cos x + \zeta_2 x^{\zeta_1} y^{\zeta_2-1} \sin z + \frac{\partial}{\partial y} k(y, z) \\ \Rightarrow \Phi(x, y, z) &= y^{\xi_1} z^{\xi_2} \cos x + x^{\zeta_1} y^{\zeta_2} \sin z + k(z) \\ \frac{\partial}{\partial z} \Phi &\stackrel{!}{=} \xi_2 y^{\xi_1} z^{\xi_2-1} \cos(x) + x^{\zeta_1} y^{\zeta_2} \cos z \\ &= \xi_2 y^{\xi_1} z^{\xi_2-1} \cos(x) + x^{\zeta_1} y^{\zeta_2} \cos z + \frac{\partial}{\partial z} k(z) \\ \Rightarrow \Phi(x, y, z) &= y^{\xi_1} z^{\xi_2} \cos x + x^{\zeta_1} y^{\zeta_2} \sin z + k \end{aligned}$$

Gruppe A: $\xi_1 = 2, \xi_2 = 3, \zeta_1 = 3, \zeta_2 = 2$

Gruppe B: $\xi_1 = 4, \xi_2 = 5, \zeta_1 = 4, \zeta_2 = 3$

Gruppe C: $\xi_1 = 5, \xi_2 = 3, \zeta_1 = 3, \zeta_2 = 3$

Gruppe D: $\xi_1 = 4, \xi_2 = 4, \zeta_1 = 4, \zeta_2 = 4$