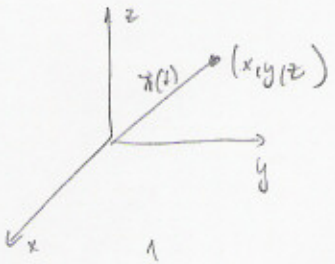
ČE OBSTAJA LOKALNO SKALARNO POLJE JE TO VEČJALO

$$\text{grad } u = (y^2z,\ 2xyz,\ xy) = \vec{a}(x,y,z)$$

1. POT



$$\vec{r}(t) = t(x,y,z) \qquad t \in [0,1]$$

$$\dot{\vec{r}}(t) = (x,y,z)$$

$$\int_{\vec{r}:(0,0,0)}^{(x,y,z)} \vec{a}\,d\vec{r} = \int_0^1 \vec{a}(tx,ty,tz)(x,y,z)\,dt =$$

$$= \int_0^1 (t^2y^2z,\ 2t^2xyz,\ t^2xy)(x,y,z)\,dt = \int_0^1 [t^3xy^2z + 2t^3xy^2z + t^2xyz]\,dt$$

$$= \int_0^1 [3t^3xy^2z + t^2xyz]\,dt = 3xy^2z\,\frac{t^4}{4}\Big|_0^1 + xyz\,\frac{t^3}{3}\Big|_0^1 = \frac{3}{4}xy^2z + \frac{1}{3}xyz$$

PREIZKUS: $\text{grad}\left(\frac{3}{4}xy^2z + \frac{1}{3}xyz\right) = \left(\frac{3}{4}y^2z + \frac{1}{3}yz,\ \frac{3}{2}xyz + \frac{1}{3}xz,\ \frac{3}{4}xy^2 + \frac{1}{3}xy\right)$

$\neq \vec{a} \Rightarrow$ POLJE $\vec{a}$ NI POTENCIALNO

2. POT:

$u_x \overset{*}{=} y^2z$

$u_y \overset{**}{=} 2xyz$

$u_z \overset{***}{=} xy$

$u_x \overset{*}{=} y^2z \Rightarrow u \overset{(1)}{=} xy^2z + \varphi(y,z)$

$\Rightarrow u_y = 2xyz + \varphi_y(y,z)$ } $\Rightarrow$

$u_y \overset{**}{=} 2xyz$

$\Rightarrow \varphi_y(y,z) = 0 \Rightarrow \varphi(y,z) = \psi(z)$

$\overset{(1)}{\Rightarrow} u \overset{(2)}{=} xy^2z + \psi(z)$

$\Rightarrow u_z = xy^2 + \psi'(z)$ } $\Rightarrow$

$u_z \overset{***}{=} xy$

$\Rightarrow \psi'(z) + xy^2 = xy \Rightarrow$

$\psi'(z) = xy - xy^2$ $\longrightarrow\!\!\leftarrow$

$\Rightarrow$ $\vec{a}$ NI POTENCIALNO POLJE