

RESI

$$(4 - \frac{y^2}{x^2})dx + 2(\frac{y}{x})dy = 0$$

$$\begin{aligned}
 P = 4 - \frac{y^2}{x^2} &\Rightarrow P_y = -\frac{2y}{x^2} \\
 Q = 2\frac{y}{x} &\Rightarrow Q_x = -\frac{2y}{x^2}
 \end{aligned}
 \left. \vphantom{\begin{aligned} P = 4 - \frac{y^2}{x^2} \\ Q = 2\frac{y}{x} \end{aligned}} \right\} \begin{array}{l} \text{EKSAKTNNA DIFERENCIALNA} \\ \text{ENAČBA} \end{array}$$

$$\begin{aligned}
 u_x &\stackrel{*}{=} 4 - \frac{y^2}{x^2} & u_x &\stackrel{*}{=} 4 - \frac{y^2}{x^2} \Rightarrow u \stackrel{(1)}{=} 4x + \frac{y^2}{x} + \varphi(y) \\
 u_y &\stackrel{**}{=} 2\frac{y}{x} & & \Rightarrow u_y = \frac{2y}{x} + \varphi'(y) \left. \vphantom{\begin{aligned} u_x &\stackrel{*}{=} 4 - \frac{y^2}{x^2} \\ u_y &\stackrel{**}{=} 2\frac{y}{x} \end{aligned}} \right\} \rightarrow \\
 & & & u_y \stackrel{**}{=} \frac{2y}{x}
 \end{aligned}$$

$$\Rightarrow \varphi'(y) = 0 \rightarrow \varphi(y) = C$$

$$\stackrel{(1)}{\Rightarrow} u = 4x + \frac{y^2}{x} + C$$

\Rightarrow REŠITEV D.E. JE OBLIKE $4x + \frac{y^2}{x} + C = D$

$$4x + \frac{y^2}{x} = E$$

$$\frac{4x^2 + y^2}{x} = E$$

ENAČBO BI LAHKO ZAPISALI KOT $y' = \frac{(\frac{y}{x})^2 - 4}{2(\frac{y}{x})}$ (ENAČBA S HOMOGENO DESNO STRANJO)

VPRLEBKU $u = \frac{y}{x} \Rightarrow y = ux \Rightarrow y' = u'x + u$

$$u'x + u = \frac{u^2 - 4}{2u}$$

$$u'x = \frac{u^2 - 4}{2u} - u = \frac{u^2 - 4 - 2u^2}{2u} = \frac{-4 - u^2}{2u}$$

$$\frac{2u du}{u^2 + 4} = -\frac{dx}{x}$$

$$\ln|u^2 + 4| = -\ln|x| + \ln C \Rightarrow |u^2 + 4| = \frac{C}{|x|} \Rightarrow \frac{(\frac{y}{x})^2 + 4}{x} = \frac{D}{x} \quad D \neq 0$$