Null-Fortsetzung

$$p\left(x{:}y\right)\alpha-\ \text{homogen}$$

$$f\left(x{:}y\right)=\frac{p\left(x{:}y\right)}{\left(x^2+y^2\right)^{\beta/2}}$$

$$\alpha<\beta+1\Longrightarrow f\left(x{:}y\right)\ \text{partiell diff}$$

$$\partial_x f\left(x{:}y\right)=\frac{\left(x^2+y^2\right)^{\beta/2}\partial_x p\left(x{:}y\right)-\dfrac{\beta}{2}\left(x^2+y^2\right)^{\beta/2-1}2x}{\left(x^2+y^2\right)^{\beta}}$$

$$=\frac{\partial_x p\left(x{:}y\right)}{\left(x^2+y^2\right)^{\beta/2}}-\frac{\beta x\partial_x p\left(x{:}y\right)}{\left(x^2+y^2\right)^{\beta/2+1}}=\frac{\left(x^2+y^2\right)\partial_x p\left(x{:}y\right)-\beta x\partial_x p\left(x{:}y\right)}{\left(x^2+y^2\right)^{\beta/2+1}}$$

$$\left(x^2+y^2\right)\partial_x p\left(x{:}y\right)-\beta x\,\partial_x p\left(x{:}y\right)\alpha+1\ \text{homogen}$$

$$\alpha+1<2\left(\frac{\beta}{2}+1\right)=\beta+2\Longrightarrow\alpha<\beta+1$$

$$\frac{xy}{\sqrt{x^2+y^2}}\ \text{stet/part diff/keine RA/nicht tot diff}$$

$$^{r\cos t|r\sin t}\text{ᴎ}=\frac{r^2\cos t\sin t}{r}=r\cos t\sin t\rightsquigarrow 0\Longrightarrow\ \text{stet in 0:0}$$

$$\text{ᴎ}\big|_{0\times\mathbb{R}}=0=\text{ᴎ}\big|_{\mathbb{R}\times 0}\ \Longrightarrow\ \text{part diff }\nabla\text{ᴎ}\left(0{:}0\right)=\left(0{:}0\right)$$

$$u^2+v^2=1\Longrightarrow\frac{^{tu:tv}\text{ᴎ}-^{0:0}\text{ᴎ}}{t}=\frac{t^2uv}{t\sqrt{t^2}}=uv\frac{t}{\overline{|t|}}\rightsquigarrow\pm uv\Longrightarrow\ \text{no RA for }uv\neq 0$$

$$\frac{^{x:y}\text{ᴎ}-^{0:0}\text{ᴎ}-\left(x|y\right)^{0:0}\underline{\text{ᴎ}}}{"\overline{x{:}y}"}=\frac{^{x:y}\text{ᴎ}}{"\overline{x{:}y}"}=\frac{xy}{x^2+y^2}{}_{x\equiv y}=\frac{1}{2}\neq 0\Longrightarrow\ \text{not tot diff}$$

$$\frac{x^3+xy}{x^2+y^2}\ \text{part diff/unstet}:\quad\frac{x^3}{x^2+y^2}\ \text{part diff/stet/diff?}:\quad\frac{x^2y-y^2x}{x^2+y^2}\ \text{part diff/stet/diff?}$$

$$\frac{x^2y}{x^2+y^2}\ \text{stet/part diff/grad/nicht tot diff}:\quad\frac{xy^2}{x^2+y^4}\ \text{unstet/RA existiert/undiff}$$

$$\frac{x^2\,y^2}{x^2 + y^2} \text{ part diff/stet? :} \quad xy\frac{x^2 - y^2}{x^2 + y^2} \text{ tot diff/2-part diff/not 2-stet part diff/Hesse unsymm}$$

$$\frac{xy}{x^2 + y^2} \text{ part diff/unstet}$$

$$^{r\cos t|r\sin t}\!\!\!\eta \;=\; \frac{r^2\cos t\sin t}{r^2} \;=\; \cos t\sin t \;\nrightarrow\; 0 \;\Longrightarrow\; \text{unstet in 0:0}$$