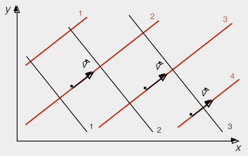
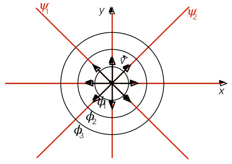
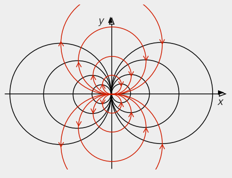
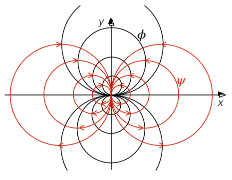
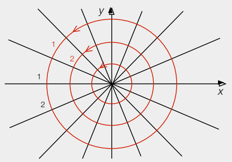
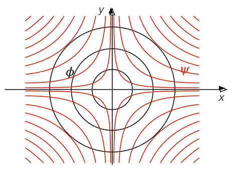
Formelsammlung zur Potentialtheorie

Elementarströmung	**Strom- und Potentiallinien**	**Potentialfunktion** $\Phi(x,y)$ $\Phi(r,\varphi)$	**Stromfunktion** $\Psi(x,y)$ $\Psi(r,\varphi)$	$u(x,y)$ $u(r,\varphi)$	$v(x,y)$ $v(r,\varphi)$	$v_r(x,y)$ $v_r(r,\varphi)$	$v\ (x,y)$ $v\ (r,\varphi)$
Translationsströmung		$u_1 x + v_1 y$ $u_1 r\cos\varphi + v_1 r\sin\varphi$	$-v_1 x + u_1 y$ $-v_1 r\cos\varphi + u_1 r\sin\varphi$	u_1 u_1	v_1 v_1	$u_1\frac{x}{\sqrt{x^2+y^2}} + v_1\frac{y}{\sqrt{x^2+y^2}}$ $u_1\cos\varphi + v_1\sin\varphi$	$u_1\frac{y}{\sqrt{x^2\quad y^2}} \quad v_1\frac{x}{\sqrt{x^2\quad y^2}}$ $-u_1\sin\varphi + v_1\cos\varphi$
Quellen- und Senkenströmung		$\frac{Q}{2\pi}\ln\sqrt{x^2+y^2}$ $\frac{Q}{2\pi}\ln r$	$\frac{Q}{2\pi}\arctan\left(\frac{y}{x}\right)$ $\frac{Q}{2\pi}\varphi$	$\frac{Q}{2\pi}\frac{x}{x^2+y^2}$ $\frac{Q}{2\pi}\frac{\cos\varphi}{r}$	$\frac{Q}{2\pi}\frac{y}{x^2+y^2}$ $\frac{Q}{2\pi}\frac{\sin\varphi}{r}$	$\frac{Q}{2\pi}\frac{1}{\sqrt{x^2+y^2}}$ $\frac{Q}{2\pi r}$	0 0
Dipolströmung (x-Achse ist Dipolachse)		$\frac{M}{2\pi}\frac{x}{x^2+y^2}$ $\frac{M}{2\pi}\frac{\cos\varphi}{r}$	$-\frac{M}{2\pi}\frac{y}{x^2+y^2}$ $-\frac{M}{2\pi}\frac{\sin\varphi}{r}$	$-\frac{M}{2\pi}\frac{x^2-y^2}{(x^2+y^2)^2}$ $-\frac{M}{2\pi}\frac{\cos(2\varphi)}{r^2}$	$-\frac{M}{2\pi}\frac{2xy}{(x^2+y^2)^2}$ $-\frac{M}{2\pi}\frac{\sin(2\varphi)}{r^2}$	$-\frac{M}{2\pi}\frac{x}{(x^2+y^2)^{1.5}}$ $-\frac{M}{2\pi}\frac{\cos\varphi}{r^2}$	$-\frac{M}{2\pi}\frac{y}{(x^2+y^2)^{1.5}}$ $-\frac{M}{2\pi}\frac{\sin\varphi}{r^2}$
Dipolströmung (y-Achse ist Dipolachse)		$\frac{M}{2\pi}\frac{y}{x^2-y^2}$ $\frac{M}{2\pi}\frac{\sin\varphi}{r}$	$\frac{M}{2\pi}\frac{x}{x^2+y^2}$ $\frac{M}{2\pi}\frac{\cos\varphi}{r}$	$-\frac{M}{2\pi}\frac{2xy}{(x^2+y^2)^2}$ $-\frac{M}{2\pi}\frac{\sin(2\varphi)}{r^2}$	$\frac{M}{2\pi}\frac{x^2-y^2}{(x^2+y^2)^2}$ $\frac{M}{2\pi}\frac{\cos(2\varphi)}{r^2}$	$-\frac{M}{2\pi}\frac{y}{(x^2+y^2)^{1.5}}$ $-\frac{M}{2\pi}\frac{\sin\varphi}{r^2}$	$\frac{M}{2\pi}\frac{x}{(x^2+y^2)^{1.5}}$ $\frac{M}{2\pi}\frac{\cos\varphi}{r^2}$
Potentialwirbel		$-\frac{\Gamma}{2\pi}\arctan\left(\frac{y}{x}\right)$ $-\frac{\Gamma}{2\pi}\varphi$	$\frac{\Gamma}{2\pi}\ln\sqrt{x^2+y^2}$ $\frac{\Gamma}{2\pi}\ln r$	$\frac{\Gamma}{2\pi}\frac{y}{x^2+y^2}$ $\frac{\Gamma}{2\pi}\frac{\sin\varphi}{r}$	$-\frac{\Gamma}{2\pi}\frac{x}{x^2+y^2}$ $-\frac{\Gamma}{2\pi}\frac{\cos\varphi}{r}$	0 0	$-\frac{\Gamma}{2\pi}\frac{1}{\sqrt{x^2+y^2}}$ $-\frac{\Gamma}{2\pi r}$
Staupunktströmung		$\frac{a}{2}(x^2-y^2)$ $\frac{a}{2}r^2 cos(2\varphi)$	axy $\frac{a}{2}r^2\sin(2\varphi)$	ax $ar\cos\varphi$	$-ay$ $-ar\sin\varphi$	$a\frac{x^2-y^2}{\sqrt{(x^2+y^2)}}$ $ar\cos(2\varphi)$	$-a\frac{2xy}{\sqrt{(x^2+y^2)}}$ $-ar\sin(2\varphi)$

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