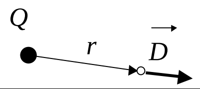
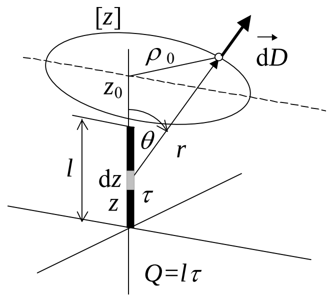


$$D(r)=\frac{Q}{4\pi r^2}$$



$$\mathrm{d}D(\rho_0,z_0)=\frac{\mathrm{d}Q}{4\pi r^2},\quad \mathrm{d}D_z=\mathrm{d}D\cos\theta,\ \mathrm{d}D_\rho=\mathrm{d}D\sin\theta$$

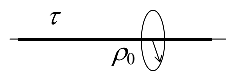
$$\mathrm{d}Q=\tau\mathrm{d}z,\quad r=\sqrt{\rho_0^2+(z_0-z)^2},\quad \cos\theta=\frac{z_0-z}{r},\quad \sin\theta=\frac{\rho_0}{r}$$

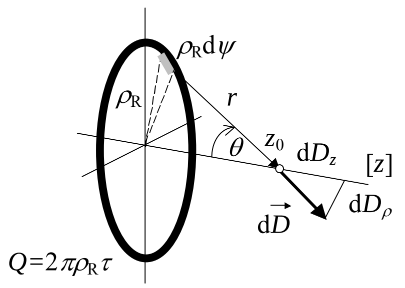
$$D_z(\rho_0,z_0)=\frac{\tau}{4\pi}\int_0^l\frac{(z_0-z)\mathrm{d}z}{\left[\rho_0^2+(z_0-z)^2\right]^{3/2}},\quad D_\rho(\rho_0,z_0)=\frac{\tau\rho_0}{4\pi}\int_0^l\frac{\mathrm{d}z}{\left[\rho_0^2+(z_0-z)^2\right]^{3/2}}$$

Špeciálne, v rovine symetrie ($z_0=l/2$): $D_z(\rho_0,\frac{l}{2})=0$ a

$$D_\rho(\rho_0,\frac{l}{2})=\frac{\tau\rho_0}{4\pi}\int_{-l/2}^{l/2}\frac{\mathrm{d}z}{\left[\rho_0^2+(\frac{l}{2}-z)^2\right]^{3/2}}=\frac{\tau\rho_0}{4\pi}\int_{-l/2}^{l/2}\frac{\mathrm{d}\xi}{\left[\rho_0^2+\xi^2\right]^{3/2}}=\frac{\tau}{4\pi\rho_0}\left[\frac{\xi}{\sqrt{\rho_0^2+\xi^2}}\right]_{-l/2}^{l/2}=\frac{\tau}{2\pi\rho_0}\frac{\frac{l}{2}}{\sqrt{\rho_0^2+(\frac{l}{2})^2}}$$

$D_\rho(\rho_0,\infty)\to\dfrac{\tau}{2\pi\rho_0}$, ako to priamo vyplýva aj z Gaussovej vety ...



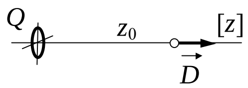


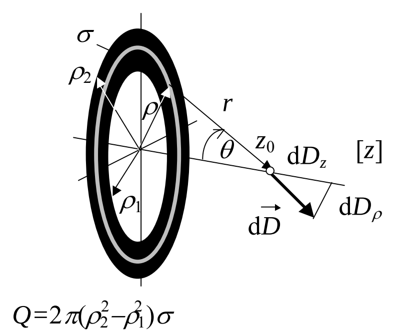
$$\mathrm{d}D(z_0)=\frac{\mathrm{d}Q}{4\pi r^2},\quad \mathrm{d}D_z=\mathrm{d}D\cos\theta,\ \mathrm{d}D_\rho=\mathrm{d}D\sin\theta,\ D_\rho=0$$

$$\mathrm{d}Q=\tau\rho_R\mathrm{d}\psi,\quad r=\sqrt{\rho_R^2+z_0^2},\ \cos\theta=\frac{z_0}{r},\ \sin\theta=\frac{\rho_R}{r}$$

$$D_z(z_0)=\frac{\tau\rho_R z_0}{4\pi\left[\rho_R^2+z_0^2\right]^{3/2}}\int_0^{2\pi}\mathrm{d}\alpha=\frac{\tau\rho_R z_0}{2\left[\rho_R^2+z_0^2\right]^{3/2}}=\frac{z_0 Q}{4\pi\left[\rho_0^2+z_0^2\right]^{3/2}}$$

$$\varphi(\infty)\to\frac{Q}{4\pi z_0^2}$$





$$\mathrm{d}D(z_0)=\frac{\mathrm{d}Q}{4\pi r^2},\quad \mathrm{d}D_z=\mathrm{d}D\cos\theta,\ \mathrm{d}D_\rho=\mathrm{d}D\sin\theta,\ D_\rho=0$$

$$\mathrm{d}Q=\sigma 2\pi\rho\mathrm{d}\rho,\quad r=\sqrt{\rho^2+z_0^2},\ \cos\theta=\frac{z_0}{r},\ \sin\theta=\frac{\rho}{r}$$

$$D_z(z_0)=\frac{\sigma}{2}z_0\int_{\rho_1}^{\rho_2}\frac{\rho\mathrm{d}\rho}{\left[\rho^2+z_0^2\right]^{3/2}}=\frac{\sigma}{2}z_0\left[\frac{1}{\sqrt{\rho_1^2+z_0^2}}-\frac{1}{\sqrt{\rho_2^2+z_0^2}}\right]$$

pri: $\rho_1=0$, $D_z(z_0)=\dfrac{\sigma}{2}\left[1-\dfrac{z_0}{\sqrt{\rho_2^2+z_0^2}}\right]$ platí pri $z_0>0$

pričom“ $D_z(-z_0)=-D_z(z_0)$ a pri $\rho_2\to\infty$ $D_z(z_0)=\dfrac{\sigma}{2}$,

čo tiež vyplýva z Gaussovej vety ...