1+1 Welle: RB: $f(0,x)=\Phi(x)$; $\partial_t f(0,x)=\Psi(x)$ ➔

$$f(t,x)=\frac{1}{2}(\Phi(x+ct)+\Phi(x-ct))+\frac{1}{2c}\int_{x-ct}^{x+ct}\Psi(\bar{x})d\bar{x}$$

3+1 Welle Kugelsymmetrie: $f(t,r)=\frac{1}{2cr}\int_{ct-r}^{ct+r}\bar{r}\Psi(\bar{r})d\bar{r}$

3+1 Welle allgemein: $f(0,\vec{x})=0$; $\partial_t f(0,\vec{x})=h(\vec{x})$ ➔

$$f(t,\vec{x})=\frac{t}{4\pi}\int_{|\vec{y}|=1}h(\vec{x}+t\vec{y})dS_y$$

Green für Poisson: $f=\frac{1}{4\pi}\int_{\mathbb{R}^3}\frac{1}{|\vec{x}-\vec{x}'|}\rho(\vec{x}')d^3x'$

Sphärische Symmetrie: $f=\frac{1}{r}\int_0^r\rho(r')r'^2dr'+\int_r^\infty\rho(r')r'dr'$

Diffusionsgleichung: $\frac{1}{\chi}\partial_t f-\Delta f=0$; RB $f(x,0)=\Phi(x)$ ➔

$$f(x,t)=\frac{1}{\sqrt{4\pi\chi t}}\int_{-\infty}^{\infty}e^{-\frac{(x-y)^2}{4\chi t}}\Phi(y)dy$$

Deltadistribution: $\int_{-\infty}^{\infty}\delta(x-a)dx=1$; $\int_{-\infty}^{\infty}\delta(x-a)\varphi(x)dx=\varphi(a)$;

$\delta f'=-\delta' f$; $\delta(ax)=\frac{1}{|a|}\delta(x)$; $3\delta''(x)+x\delta'''(x)=0$;

$x\delta(x-a)=a\delta(x-a)$; $\delta(x^2-a^2)=\frac{1}{2|a|}(\delta(x-a)+\delta(x+a))$

O-Symbol: $f(\vec{x})=O(\frac{1}{r^l})$, $|\partial_{i1}\partial_{i2}\partial_{i3}...\partial_{ik}f(\vec{x})|=O(\frac{1}{r^{l+k}})$

Legendre-Polynome: $(x^2-1)\frac{dP_n(x)}{dx}=n(xP_n(x)-P_{n-1}(x))$

$$P_n(x)=\frac{1}{\pi}\int_0^\pi(x\pm\cos(\varphi)\sqrt{x^2-1})^n d\varphi;\quad P_n(x)=\frac{1}{2^n n!}\frac{d^n(x^2-1)^n}{dx^n}$$

$$(n+1)P_{n+1}(x)=(2n+1)xP_n(x)-nP_{n-1}(x)$$

$$\int_{-1}^{1}P_n(x)P_m(x)dx=0;\quad \int_{-1}^{1}(P_n(x))^2dx=\frac{2}{2n+1}$$

$$\int_0^\infty e^{-a^2x^2}dx=\frac{\sqrt{\pi}}{2a};\quad \sin(z)=\frac{e^{iz}-e^{-iz}}{2i};\quad \cos(z)=\frac{e^{iz}+e^{-iz}}{2};$$

$$\sinh(z)=\frac{e^z-e^{-z}}{2};\quad \cosh(z)=\frac{e^z+e^{-z}}{2}$$