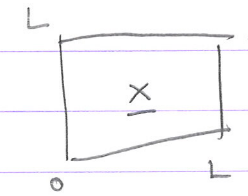
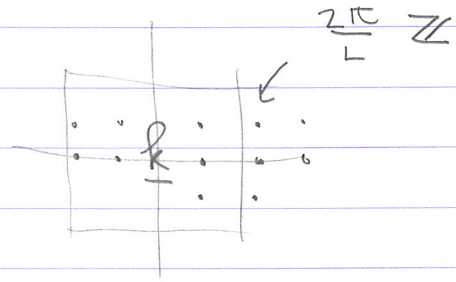
CONTINUOUS





$$\hat{f}(\underline{k}) = \int_{[0,L]^3} f(\underline{x})\, e^{-i\underline{k}\underline{x}}\, d\underline{x} \qquad \underline{k} \in \frac{2\pi}{L}\mathbb{Z}$$

$$f(\underline{x}) = \frac{1}{L^3} \sum_{\underline{k} \in \frac{2\pi}{L}\mathbb{Z}} \hat{f}(\underline{k})\, e^{i\underline{k}\underline{x}} \qquad \underline{x} \in [0,L]^3$$

parseval

$$\int_{[0,L]^3} | f(\underline{x}) |^2\, d\underline{x} = \frac{1}{L^3} \sum_{\underline{k} \in \frac{2\pi}{L}\mathbb{Z}} | \hat{f}(\underline{k}) |^2$$

MATLAB

$$\mathrm{FFTN}(m+1) = \sum_{n=0}^{N-1} \mathrm{IFFTN}(n+1)\, e^{-2\pi i \frac{1}{N} nm}$$

$$\mathrm{IFFTN}(n+1) = \frac{1}{N^3} \sum_{m=0}^{N-1} \mathrm{FFTN}(m+1)\, e^{2\pi i \frac{1}{N} nm}$$

$$n, m \in [0, \ldots N-1]$$

parseval

$$\sum_{n=0}^{N-1} | \mathrm{IFFTN}(n+1) |^2 = \frac{1}{N^3} \sum_{m=0}^{N-1} | \mathrm{FFTN}(m+1) |^2$$

DISCRETE

$$x_n = \frac{n}{N} L \qquad k_m = \frac{2\pi}{L}\left(m - \frac{N}{2}\right) \qquad m,n \in [0, N-1]$$

$$x_n = \{0, \Delta x, 2\Delta x, \ldots, L - \Delta x\}$$

$$k_m = \left\{-\frac{2\pi}{2\Delta x}, \ldots, 0, \ldots, \frac{2\pi}{2\Delta x} - \frac{2}{N}\frac{2\pi}{2\Delta x}\right\}$$

$$f(x_n) = \mathrm{IFFTN}(n+1)$$

$$\underbrace{\hat{f}(\underline{k})}_{\text{extend}} \simeq \sum_n \Delta x^3 f(x_n)\, e^{-i k_m x_n}$$

$$= L^3 \sum_n \frac{1}{N^3} \mathrm{IFFTN}(n+1)\, e^{-i \frac{2\pi}{\cancel{L}}\left(m - \frac{N}{2}\right)\frac{n}{N}\cancel{L}}$$

$$= L^3 \sum_n \frac{1}{N^3} \mathrm{IFFTN}(n+1)\, e^{-2\pi i mn/N}\, \underbrace{e^{+2\pi i \frac{n}{2}}}$$

$$= \frac{L^3}{N^3} \underbrace{\mathrm{FFTN}(k+1)}_{\text{internal}} = \Delta x^3 \mathrm{FFTN}(k+1)$$

niet en
moet om-draaien
nodig anders X
niet doen!

parseval

$$\int_{[0,L]^3} |f(x)|^2 \, dx = \sum_{\underline{n}} \Delta x^3 \, |\text{IFFTN}(n+1)|^2$$

$$= \left(\frac{\Delta x}{N}\right)^3 \sum_{m=0}^{N-1} |\text{FFTN}(m+1)|^2$$

$$= \frac{1}{L^3} (N \Delta x)^3 \left(\frac{\Delta x}{N}\right)^3 \sum_{m=0}^{N-1} |\text{FFTN}(m+1)|^2$$

$$= \frac{1}{L^3} \sum_{m=0}^{N-1} |\Delta x^3 \, \text{FFTN}(m+1)|^2$$

$$\simeq \frac{1}{L^3} \sum_{m=0}^{N-1} |\hat{f}(k)|^2$$

So $$E_k = \int_{[0,L]^3} \frac{1}{2} |u_i(x)|^2 \, dx$$

$$\simeq \frac{1}{L^3} \sum_{m=0}^{N-1} \frac{1}{2} |\Delta x^3 \, \hat{u}_i(m+1)|^2$$

$$= \frac{1}{2L^3} \Delta x^6 \sum_{m=0}^{N-1} \left(|\hat{u}(m+1)|^2 + |\hat{v}(m+1)|^2 + |\hat{w}(m+1)|^2 \right)$$

$$k = \frac{2\pi}{L} m = dk \cdot m$$

$$\frac{E}{k} = \frac{E}{m}\frac{m}{k} = \frac{E}{m}\frac{1}{dk} \qquad \left(\frac{E}{m}\right) = dk\left(\frac{E}{k}\right)$$

$$\frac{1}{(k\_mag)^2} = \frac{1}{(m\_mag^2)}\left(\frac{m_{mag}}{k_{mag}}\right)^2 = \frac{1}{|m|^2}\frac{1}{(dk)^2}$$

$$\Rightarrow \quad \frac{1}{|m|^2} = \frac{dk^2}{k}$$

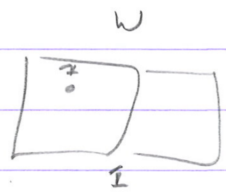
gedaan,

- ☐ ifft dr fac
- ☐

to do.

- ☐ kay procedure..

wn mag ~ desired... energy / old energy



Wybe [M(1), M(2), M(3))

Jane [M(0), M(1), M(2))

$\boxed{\text{energy data}}$