

# SIMPLIFICATIONS

- $t_i$  used to multiply  $B_0$  by in  $A$  increase only in discrete steps for each phase-encode step
- Ignore any susceptibility in frequency-encode direction

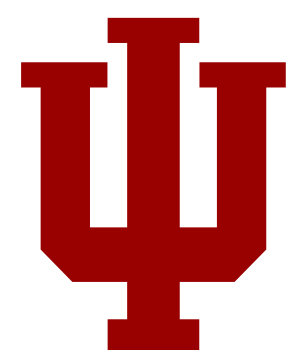
$$\mathbf{K} = \begin{bmatrix} \underbrace{\mathbf{K}_1}_{n \times n} & \mathbf{0} & \cdots & \mathbf{0} \\ \mathbf{0} & \underbrace{\mathbf{K}_2}_{n \times n} & \cdots & \mathbf{0} \\ \vdots & \vdots & \ddots & \vdots \\ \mathbf{0} & \mathbf{0} & \cdots & \underbrace{\mathbf{K}_n}_{n \times n} \end{bmatrix} \quad \hat{\boldsymbol{\rho}}_i = \mathbf{K}_i^+ \mathbf{f}_i$$

$$\mathbf{F}_{jk} = e^{-2\pi\sqrt{-1}\frac{\left(j-\frac{n}{2}-1\right)\left(k-\frac{n}{2}-1\right)}{n}}, \quad j, k = 1, 2, \dots, n$$

$$[\mathbf{A}_i]_{jk} = e^{-2\pi\sqrt{-1}\left(\frac{\left(j-\frac{n}{2}-1\right)\left(k-\frac{n}{2}-1\right)}{n} + \frac{j}{n}\Delta B_0(x_i, y_k)\right)}$$

$$A^+ = (A^T A)^{-1} A^T$$

Kadah and Hu, 1997



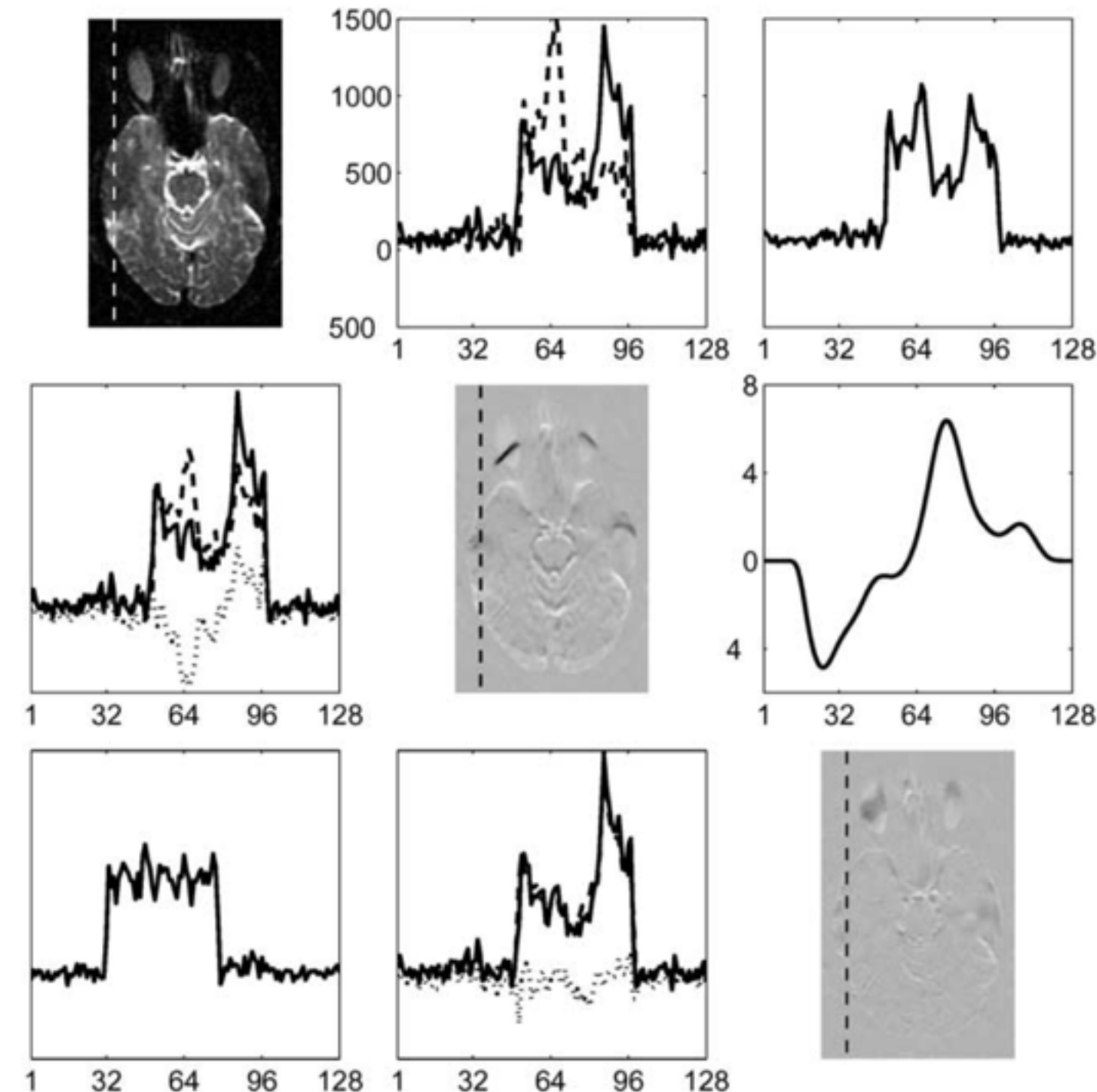
# INVERSE FOR SURE

$$\underbrace{\begin{bmatrix} \widehat{\mathbf{e}}_+ \\ \widehat{\mathbf{e}}_- \end{bmatrix}}_{2n \times 1} = \underbrace{\mathbf{R}(\mathbf{b})}_{2n \times 2n} \underbrace{\begin{bmatrix} \mathbf{f}_+ \\ \mathbf{f}_- \end{bmatrix}}_{2n \times 1}$$

$$\underbrace{\mathbf{R}(\mathbf{b})}_{2n \times 2n} = \underbrace{\mathbf{I}}_{2n \times 2n} - \underbrace{\begin{bmatrix} \mathbf{K}_+(\mathbf{b}) \\ \mathbf{K}_-(\mathbf{b}) \end{bmatrix}}_{2n \times 1}$$

$$\times \underbrace{\left( \begin{bmatrix} \mathbf{K}_+^T(\mathbf{b}) & \mathbf{K}_-^T(\mathbf{b}) \end{bmatrix} \begin{bmatrix} \mathbf{K}_+(\mathbf{b}) \\ \mathbf{K}_-(\mathbf{b}) \end{bmatrix} \right)}_{n \times n}^{-1}$$

$$\times \underbrace{\begin{bmatrix} \mathbf{K}_+^T(\mathbf{b}) & \mathbf{K}_-^T(\mathbf{b}) \end{bmatrix}}_{n \times 2n},$$



$$\min_{\arg=\mathbf{b}} O(\mathbf{b}) = \left( \sum_{c=1}^m \begin{bmatrix} \mathbf{f}_{c+}^T & \mathbf{f}_{c-}^T \end{bmatrix} \mathbf{R}_c(\mathbf{b}) \begin{bmatrix} \mathbf{f}_{c+} \\ \mathbf{f}_{c-} \end{bmatrix} \right)$$

