

JACOBIAN MODULATION

$$f_+(\mathbf{x} - [0 \quad d(\mathbf{x}, \mathbf{b}) \quad 0]^T) \left(1 - \frac{\partial d}{\partial y} \bigg|_{\mathbf{x}} \right) \\ \approx f_-(\mathbf{x} + [0 \quad d(\mathbf{x}, \mathbf{b}) \quad 0]^T) \left(1 + \frac{\partial d}{\partial y} \bigg|_{\mathbf{x}} \right)$$

$$\sum_{x \in V} \left(f_+(\mathbf{x} - [0 \quad d(\mathbf{x}, \mathbf{b}) \quad 0]^T) \left(1 - \frac{\partial d}{\partial y} \bigg|_{\mathbf{x}} \right) - f_-(\mathbf{x} + [0 \quad d(\mathbf{x}, \mathbf{b}) \quad 0]^T) \left(1 + \frac{\partial d}{\partial y} \bigg|_{\mathbf{x}} \right) \right)^2$$

$$\underbrace{\mathbf{B}(\mathbf{x})}_{n \times m} = \underbrace{\mathbf{B}_z(z)}_{n_z \times m_z} \otimes \underbrace{\mathbf{B}_y(y)}_{n_y \times m_y} \otimes \underbrace{\mathbf{B}_x(x)}_{n_x \times m_x}$$

$$\underbrace{\frac{d\mathbf{f}_+}{d\mathbf{b}}}_{n \times m} = \underbrace{-diag\left(\frac{\partial \mathbf{f}_+}{\partial y}\right)}_{n \times n} \underbrace{\mathbf{B}}_{n \times m} - \underbrace{diag(\mathbf{f}_+)}_{n \times n} \underbrace{\frac{\partial \mathbf{B}}{\partial y}}_{n \times m}$$

$$\underbrace{\mathbf{b}_i}_{m \times 1} = \underbrace{\mathbf{b}_{i-1}}_{m \times 1} + \left(\underbrace{\left[\left(\frac{d\mathbf{f}_+}{d\mathbf{b}} \right)^T \quad \left(\frac{d\mathbf{f}_-}{d\mathbf{b}} \right)^T \right]}_{m \times 2n} \underbrace{\begin{bmatrix} \mathbf{I} & -\mathbf{I} \\ -\mathbf{I} & \mathbf{I} \end{bmatrix}}_{2n \times 2n} \underbrace{\begin{bmatrix} \frac{d\mathbf{f}_+}{d\mathbf{b}} \\ \frac{d\mathbf{f}_-}{d\mathbf{b}} \end{bmatrix}}_{2n \times m} \right)^{-1} \\ \times \underbrace{\left[\left(\frac{d\mathbf{f}_+}{d\mathbf{b}} \right)^T \quad \left(\frac{d\mathbf{f}_-}{d\mathbf{b}} \right)^T \right]}_{m \times 2n} \underbrace{\begin{bmatrix} \mathbf{I} & -\mathbf{I} \\ -\mathbf{I} & \mathbf{I} \end{bmatrix}}_{2n \times 2n} \underbrace{\begin{bmatrix} \mathbf{f}_+ \\ \mathbf{f}_- \end{bmatrix}}_{2n \times 1}$$

THY COMPUTE

- So is this solved?
- Far from it

$$\mathbf{B}^T \mathbf{B} = \mathbf{B}_z^T \mathbf{B}_z \hat{\otimes} \mathbf{B}_y^T \mathbf{B}_y \otimes \mathbf{B}_x^T \mathbf{B}_x$$
$$(\mathbf{B}_z \otimes \mathbf{B}_y \otimes \mathbf{B}_x)^T \mathbf{D} \mathbf{D} (\mathbf{B}_z \otimes \mathbf{B}_y \otimes \mathbf{B}_x)$$