$$\partial_t b(u) - \nabla \cdot \nabla u = f \qquad \text{(A)}$$

1

$$b(u^n) - \tau \nabla \cdot \nabla u^n = \tau f^n + b(u^{n-1}) \qquad \text{(B)}$$

2

$$b(u^{n,j-1}) + L(u^{n,j} - u^{n,j-1}) - \tau \nabla \cdot \nabla u^{n,j} = \tau f^n + b(u^{n-1}) \qquad \text{(C)}$$

MPFA-L discretization

Modified finite element discretization

3

$\tilde{u}_h^{n,j}$ ⟺ $u_h^{n,j}$

Equivalence, theorem 3.01