

*\$ 1) 2D continuous equation*

$$\eta_{t+1} = \eta_{t-1} - 2*dt*(\delta_f^x(D_b^x * U) + \delta_f^y(D_b^y * V))$$

*\$ 2) The code constructed by operators*

$$elf = elb - 2*dt*(DXF(AXB(D)*U) + DYF(AYB(D)*V))$$

*\$ 3) The pseudo-code*

```
exchange2d_mpi(u,im,jm)
exchange2d_mpi(v,im,jm)
exchange2d_mpi(D,im,jm)
```

```
do i = 1, im
```

```
do j = 1, jm
```

```
elf(i,j) = elb(i,j) - 2*dt*(
    &
    ((D(i+1,j) + D(i,j))/2 * u(i+1,j) - (D(i,j) + D(i-1,j))/2 * u(i,j))/dx(i,j) + &
    ((D(i,j+1) + D(i,j))/2 * v(i+1,j) - (D(i,j) + D(i,j-1))/2 * v(i,j))/dy(i,j))
```