$|\mathbf{v}_k'| = |\Gamma^{\pm}[\mathbf{v}_k;\zeta_{\mathbf{v}_k}]|$ 2. Full-step **half** x update:

1. Half-step full v update:

Invertible NN

$$egin{aligned} \mathbf{x}_k' \ &= \ m{m}^k \odot \mathbf{x}_k + m{ar{m}}^k \odot m{lack}^{\pm} \left[ar{\mathbf{x}}_k ; \zeta_{ar{\mathbf{x}}_k}
ight] \end{aligned}$$

3. Full-step **half** x update:

$$egin{align*} \mathbf{x}_k'' &= ar{m{m}}^k \odot ar{\mathbf{x}}_k' + m^k \odot egin{bmatrix} m{\Lambda}^{\pm} \left[\mathbf{x}_k'; \zeta_{\mathbf{x}_k'}
ight] \end{bmatrix}$$

4. Half-step full
$$v$$
 update:
$$\mathbf{v}_k'' = \boxed{\Gamma^{\pm}[\mathbf{v}_k';\zeta_{\mathbf{v}_k'}]}$$