

$$\boxed{\mathbb{F}}_i \stackrel{\text{motion}}{=} \boxed{\mathbb{F}}_i^\mu$$

$$\mathbb{F}_i \in \mathbb{R}^d \triangleleft_{\infty} \mathbb{R} \text{ vanish at } \infty \Rightarrow \int_{dx} x_\mu^i \mathbb{F}_i^x = - \int_{dx} x_\mu^i \mathbb{F}_i^x$$

$$\mathbb{F}_i^x \mathcal{L} = x_\mu^i \boxed{x: \mathbb{F}_i^x} + x_\mu^i \boxed{x: \mathbb{F}_i^x}^\mu = x_\mu^i \boxed{\mathbb{F}_i^x} + x_\mu^i \boxed{\mathbb{F}_i^x}^\mu \Rightarrow$$

$$\mathbb{F}_i \int_{dx}^x \mathcal{L} = \int_{dx} \mathbb{F}_i^x \mathcal{L} = \int_{dx} x_\mu^i \boxed{\mathbb{F}_i^x} + x_\mu^i \boxed{\mathbb{F}_i^x}^\mu = \int_{dx} x_\mu^i \boxed{\mathbb{F}_i^x} - x_\mu^i \boxed{\mathbb{F}_i^x}^\mu = \int_{dx} x_\mu^i \overbrace{\boxed{\mathbb{F}_i^x} - \boxed{\mathbb{F}_i^x}^\mu}^{=0}$$

$$\nu_\mu \delta^\mu \boxed{\mathbb{F}}_i - \nu_\mu^i \boxed{\mathbb{F}}_i^\mu = \nu \boxed{\mathbb{F}}_i$$

$$\nu \boxed{\mathbb{F}}_i = \nu \boxed{\mathbb{F}}_i + \nu_\mu^i \boxed{\mathbb{F}}_i^x + \nu_\mu^i \boxed{\mathbb{F}}_i^\mu$$

$$\Rightarrow \text{LHS} = \nu \boxed{\mathbb{F}}_i - \overbrace{\nu_\mu^i \boxed{\mathbb{F}}_i^x + \nu_\mu^i \boxed{\mathbb{F}}_i^\mu}^{\mu^*}$$

$$= \nu \boxed{\mathbb{F}}_i + \nu_\mu^i \boxed{\mathbb{F}}_i^x + \nu_\mu^i \boxed{\mathbb{F}}_i^\mu - \nu_\mu^i \boxed{\mathbb{F}}_i^x - \nu_\mu^i \boxed{\mathbb{F}}_i^\mu = \nu \boxed{\mathbb{F}}_i$$