

$$\frac{\mathrm{d}}{\mathrm{d}t} \int_{V_i} u_i(t) \, \mathrm{d}V_i = \int_{V_i} \nabla \cdot \mathbf{D} \nabla u_i(t) \, \mathrm{d}V$$

$$\left| \begin{array}{l} u_i(t) : \text{number} \end{array} \right.$$

$$\frac{d}{dt} \int_{V_i} u_i(t) \, dV_i = \int_{V_i} \nabla \cdot \mathbf{D} \nabla u_i(t) \, dV$$

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$$\frac{d}{dt} \int_{V_i} u_i(t) dV_i = \int_{V_i} \nabla \cdot D \nabla u_i(t) dV$$

$$\frac{d}{dt} u_i(t) \underbrace{\int_{V_i} dV_i}_{|V_i|} = \int_{V_i} \nabla \cdot D \nabla u_i(t) dV$$

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$$\frac{d}{dt} \int_{V_i} u_i(t) dV_i = \int_{V_i} \nabla \cdot D \nabla u_i(t) dV \quad \left| \quad u_i(t) : \text{number} \right.$$

$$\frac{d}{dt} u_i(t) \underbrace{\int_{V_i} dV_i}_{|V_i|} = \int_{V_i} \nabla \cdot D \nabla u_i(t) dV$$

$$\Rightarrow \quad \frac{d}{dt} u_i(t) = \frac{1}{|V_i|} \int_{V_i} \nabla \cdot D \nabla u_i(t) dV \quad \left| \quad \int_{t^n}^{t^{n+1}} dt \right.$$