## 张量的梯度与积分推导 四. 张星的偏粉

(一)、梯度的计算

 $y(x_i)$   $\nabla = \frac{\partial}{\partial x_i} e_i$ 

79= 300 9= 34 60

右梯度:

 $\Psi$   $\overline{7} = \Psi(x_i) \frac{\partial}{\partial x_i} e_i = \frac{\partial \Psi}{\partial x_i} e_i$  对特定的:

左梯度"
$$\nabla g = \left(\frac{\partial}{\partial x_i} \vec{e_i}\right) g(x_i) = \vec{e_i} \frac{\partial g}{\partial x_i}$$

②. 对代的. V= V; 已; =>

林健 VOV = Vieio 3 = 3xi(Viei)的

 $\sqrt{\vec{e}_i} \otimes \vec{\vec{e}_j} = \vec{\vec{e}_i} \otimes \vec{\vec{e}_j} + \sqrt{\vec{\vec{e}_i}} \vec{\vec{e}_i} \otimes \vec{\vec{e}_j}$ 

= 3Vi Ci & Cy = Vij Ci & Cy

松度· V⊗V = 元 ei ⊗Vj ej = Ni ei ⊗ej

= <u>avi</u> ej & ei = vij ej & ei

因而有, √⊗√=(√⊗√)

= 2 €: 0 Việ

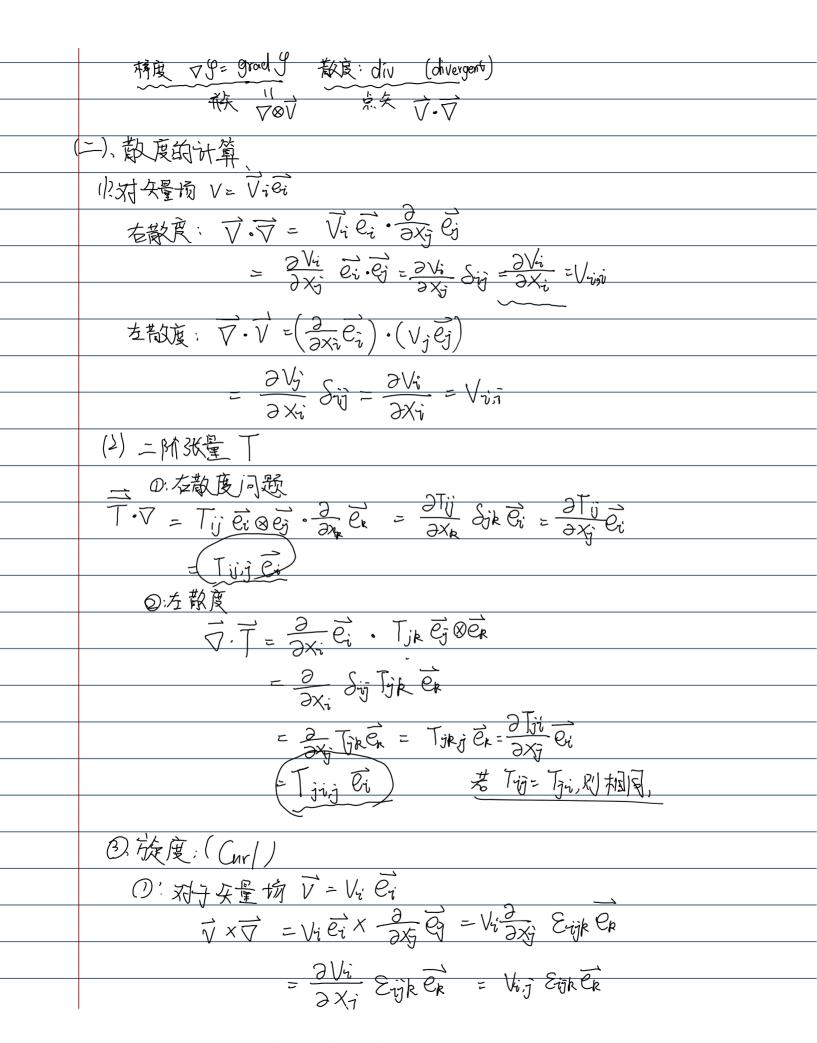
(3)、二所珠量T=Tijei⊗ey

= 31/2 Ei 8 Ei

①. 对右梯度:

右腹 T⊗V = Tij ei⊗eg⊗ AXR er

= <u>ƏTi</u> 克⊗唠⊗耍 左糠度: ▽⊗T= <u>3</u>. ei



$$= \frac{2 \text{ W}}{2 \times 7} \cdot \text{ Eight } \hat{\mathbf{C}}_{h} \cdot \hat{\mathbf{C}}_{$$

,
$\overrightarrow{\nabla} \otimes \overrightarrow{\nabla} = \frac{\partial}{\partial x_i} \overrightarrow{e_i} \otimes \frac{\partial}{\partial x_j} \overrightarrow{e_j} = \frac{\partial^2}{\partial x_i \partial x_j} \overrightarrow{e_i} \otimes \overrightarrow{e_j}$