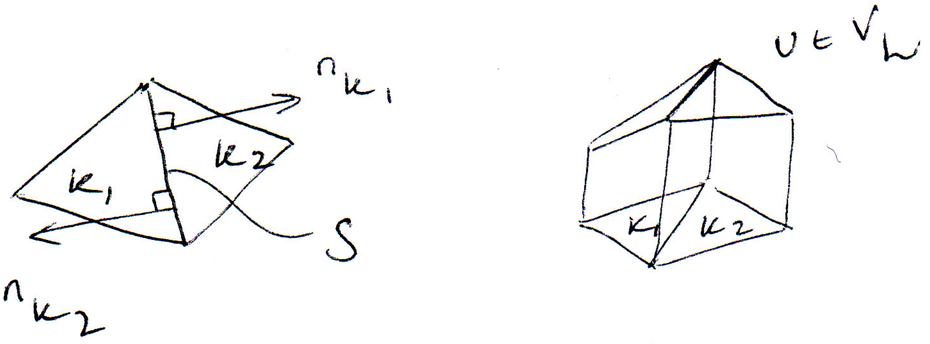
Each internal edge $S \in \mathcal{S}_h$ occurs twice, with opposite signs of outward normal :



Let $\partial_S v$ be the derivative of v in one of the directions n_{K_1} or n_{K_2} : $\partial_S v$ will in general be discontinuous over S.

Let $[\partial_S v]$ be the jump (difference) in $\partial_S v$ from the two triangles K_1 & K_2.

Rewrite the surface integrals over $\partial\Omega$ as integrals over S instead :

$$\sum_K \int_{\partial K} \frac{\partial U}{\partial n_K}(e - \tilde{\pi}_L e)\, ds = \sum_{S \in \mathcal{S}_h} \int_S [\partial_S U](e - \tilde{\pi}_L e)\, ds$$

$$\Rightarrow \|\nabla e\|^2 = \sum_K \int_K (f + \Delta U)(e - \tilde{\pi}_h e)\, dx + \sum_{S \in \mathcal{S}_h} \int_S [\partial_S U](e - \tilde{\pi}_h e)\, ds$$

Then distribute the jump to each of the two triangles to get

$$\|\nabla e\|^2 = \sum_K \int_K (f + \Delta U)(e - \tilde{\pi}_L e)\, dx + \frac{1}{2}\int_{\partial K} [\partial_S U](e - \tilde{\pi}_h e)\, ds$$