L is "continuous" since by linearity:

$$|L(v)-L(w)| = |L(v-w)| \leq \varkappa_3 \|v-w\|_V$$

so that $L(v) \to L(w)$ if $\|v-w\|_V \to 0$.
($v \to w$ in V)

Similar with $a(\cdot,\cdot)$.

<u>Energy norm</u>: $\|v\|_a = \sqrt{a(v,v)}$

- $\|v\|_a \geq 0$ since $\|v\|_a^2 = a(v,v) \geq \varkappa_1 \|v\|_V^2 \geq 0$
- $\|\cdot\|_a$ & $\|\cdot\|_V$ are <u>equivalent norms</u>:

$$\varkappa_1 \|v\|_V^2 \leq \|v\|_a^2 \leq \varkappa_2 \|v\|_V^2$$

If we choose the norm in V to be $\|\cdot\|_a$ we get $\varkappa_1 = \varkappa_2 = 1$.

<u>Abstract Galerkin method</u>: Find $U \in V_h$ s.t.

$$a(U,v) = L(v) \quad \text{for all } v \in V_h$$

where $V_h \subset V$ finite dimensional subspace.

<u>Galerkin orthogonality</u>: $a(u-U,v) = 0 \quad \forall v \in V_h$