## 2. Operator Formulation

(36) $\boxed{\text{Find } (u,\lambda)\in X\times\Lambda_c:\quad \begin{aligned} Au + B^*\lambda &= f \text{ in } X^* \\ Bu - t^2 C\lambda &= g \text{ in } \Lambda_c^* \end{aligned}}$

$\Updownarrow$

(37) $\boxed{\text{Find } (u,\lambda)\in X\times\Lambda_c:\quad L\binom{u}{\lambda} = \binom{f}{g} \text{ in } X^*\times\Lambda_c^*}$

with

$$L := \begin{bmatrix} A & B^* \\ B & -t^2 C \end{bmatrix} : X\times\Lambda \mapsto X^*\times\Lambda^* :$$

(38) $\left\langle L\binom{u}{\lambda}, \binom{v}{\mu}\right\rangle := A(u,\lambda;v,\mu) \quad \forall (u,\lambda),(v,\mu)\in X\times\Lambda$

- Define semi-norm

(39) $|\mu|_c := \sqrt{c(\mu,\mu)} \quad \forall \mu\in\Lambda$

on $\Lambda_c$ and the graph norm

(40) $|||(v,\mu)||| := \|v\|_X + \|\mu\|_\Lambda + t\,|\mu|_c$

on $\Lambda_c\times X$.