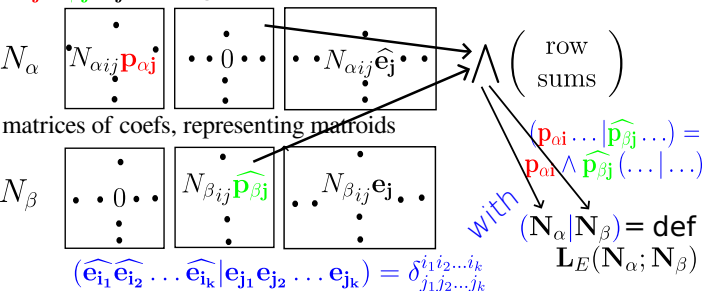


$\mathbf{p}_{\alpha j}, \mathbf{p}_{\beta j}, \mathbf{e}_j$: free generators, space basis elements



$$\textcircled{1} = \mathbf{L}_{E \setminus e}(\mathbf{N}_\alpha \setminus \mathbf{e}; \mathbf{N}_\beta \setminus \mathbf{e}) + \mathbf{L}_{E \setminus e}(\mathbf{N}_\alpha / \mathbf{e}; \mathbf{N}_\beta / \mathbf{e})$$

$\in \wedge \mathbf{P}_\alpha \cup \widehat{\mathbf{P}}_\beta$: Exterior Algebra (anti-comm!)

$$\textcircled{2} = \sum_{F \subseteq E} ([\mathbf{N}_\alpha / F | \mathbf{P}_\alpha] \mid [\mathbf{N}_\beta / F | \widehat{\mathbf{P}}_\beta])$$

$$= \sum_{F \subseteq E} [\mathbf{N}_\alpha / F | \mathbf{P}_\alpha] \wedge [\mathbf{N}_\beta / F | \widehat{\mathbf{P}}_\beta]$$

Like $|\text{Graph Laplacian}| = |I I^t| = \sum_{F \subseteq E} |I(F)|^2$

$= \sum_{T: \text{span. tree}} 1$ (Cauchy-Binet expansion)