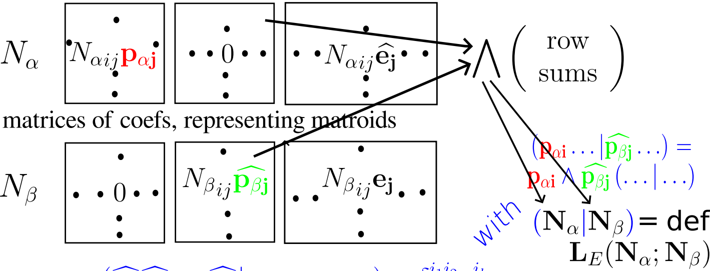
$\mathbf{p}_{\alpha\mathbf{j}}, \mathbf{p}_{\beta\mathbf{j}}, \mathbf{e}_{\mathbf{j}}$ : free generators, space basis elements




$$(\widehat{\mathbf{e}_{\mathbf{i_1}}}\widehat{\mathbf{e}_{\mathbf{i_2}}}\ldots\widehat{\mathbf{e}_{\mathbf{i_k}}}|\mathbf{e}_{\mathbf{j_1}}\mathbf{e}_{\mathbf{j_2}}\ldots\mathbf{e}_{\mathbf{j_k}}) = \delta^{i_1 i_2 \ldots i_k}_{j_1 j_2 \ldots j_k}$$

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

$\in \bigwedge P_\alpha \cup \widehat{P_\beta}$ : Exterior Algebra (anti-comm!)

$$2 = \sum_{F\subseteq E}([\mathbf{N}_\alpha/F|P_\alpha] \quad | \quad [\mathbf{N}_\beta/F|\widehat{P_\beta}])$$
$$= \sum_{F\subseteq E}[\mathbf{N}_\alpha/F|P_\alpha] \wedge [\mathbf{N}_\beta/F|\widehat{P_\beta}]$$

Like $|\text{Graph Laplacian}| = |I\ I^t| = \sum_{F\subseteq E}|I(F)|^2$
$= \sum_{T:\text{span. tree}} 1$ (Cauchy-Binet expansion)