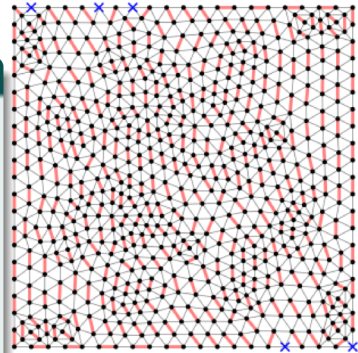


AMG based on weighted graph matching

Given a graph $G = (\mathcal{V}, \mathcal{E})$ (with adjacency matrix A), and a weight vector \mathbf{w} we consider the weighted version of G obtained by considering the weight matrix \hat{A} :

$$(\hat{A})_{i,j} = \hat{a}_{i,j} = 1 - \frac{2a_{i,j}w_iw_j}{a_{i,i}w_i^2 + a_{j,j}w_j^2},$$

- a *matching* \mathcal{M} is a set of pairwise non-adjacent edges, containing no loops;
- a **maximum product matching** if it maximizes the product of the weights of the edges $e_{i \rightarrow j}$ in it.



To increase dimension reduction we can perform **more than one sweep of matching** per step.