\[ L_c = \left[ \begin{array}{c} \frac{L_2}{L_1} \\ \frac{L_2}{L_1} \end{array} \right] \]

Implementation: Requires finding \( L \), (minor of)

The centroids of these.

1. Pick some outer face and pin it
   Tutte Embedding (bar center is embedding)

2. Put the remaining vertices at
   down in convex position.

The Laplacian of \( G \)

The Laplacian of \( G \)
A convex rep.

A planar, 3-connected graph is

Thm: Tutte, A barycentric embedding of

A convex polygon.

Is a drawing s.t. every face is

Def: A convex representation of a
No overlaps

No face zig-zags

No winding

No self-crossings on face

The 4 Bad Things
c(f) that don't happen
If $\bar{q} \geq p$, then $\bar{q} \geq p$.

If $\bar{q} \geq p$, then $\bar{q} \geq p$.

There exists a monotone path from $p$ to $F$.

Claim: $A$ & $v$ are.

If a path in $G$ is monotone, then

Let $v \in \mathbb{R}^+$ be vertices of outer face

Monotone Paths
\[ P \geq \exists y \text{ such that } y \in F \text{ and } E \geq y \]

Add (p,v) to path... repeat.
Every face $a$ of the graph $G$ has degree $d(a) = \deg(a)$. Let $K$ be the number of edges in $G$. Then, by the degree sum formula, we have:

$$E = \frac{1}{2} \sum_{a \in V(G)} \deg(a) = \frac{1}{2} \sum_{a \in V(G)} d(a) = \frac{1}{2} \cdot K.$$ 

Claim: There are no disjoint paths $a \rightarrow c$ and $b \rightarrow d$. Double-crossing a face $f$
No self crossing a face boundary
Why not Trotte?

Spread could be as