6.885
L3.2
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Generic rigidity:

rigidity is "usually" a property of the graph, not the linkage/configuration

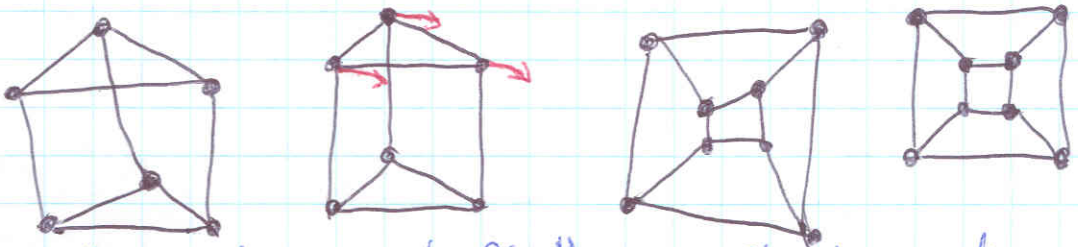
Realization C of a graph G = any $C: V \to \mathbb{R}^d$
= any point in $\mathbb{R}^{dn}$, where $n = |V|$.
— induces a linkage $[\ell(v,w) = \|C(v) - C(w)\|]$

Generic realization C = points in C's image
avoid any "degeneracies"
i.e. any desired "rare" conditions (finitely many)
i.e. any lower-dimensional subset of $\mathbb{R}^{dn}$

— e.g.: no 3 points collinear (in $d \geq 2$)
— depends on the n points in $\mathbb{R}^d$, not the graph G

- Almost every realization is generic
  i.e. random realization is generic with probability 1
  (all but lower-dimensional subset)
- For a graph G, either
  — all generic realizations are rigid $\Rightarrow G$ generically rigid
  or
  — all generic realizations are flexible $\Rightarrow G$ generically flexible

Examples:



generically rigid | rarely flexible | gen. flexible | rarely rigid

Minimally gen. rigid graph = gen. rigid graph
+ removing any edge $\Rightarrow$ gen. flexible

— goal: characterize min. gen. rigid graphs
— gen. rigid graphs = supergraphs of min. gen. rigid graphs
→ can add edges but not vertices