On the snappability of frameworks

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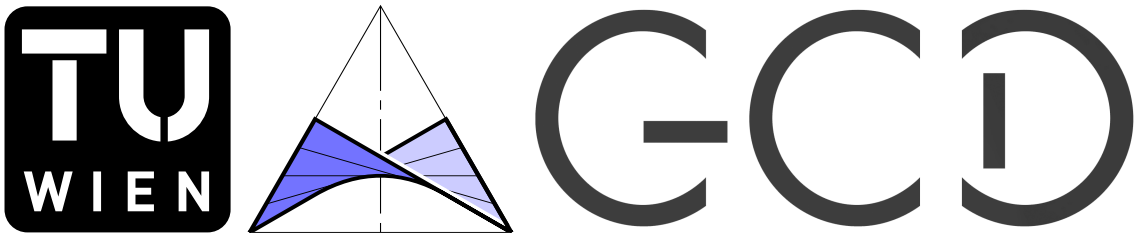

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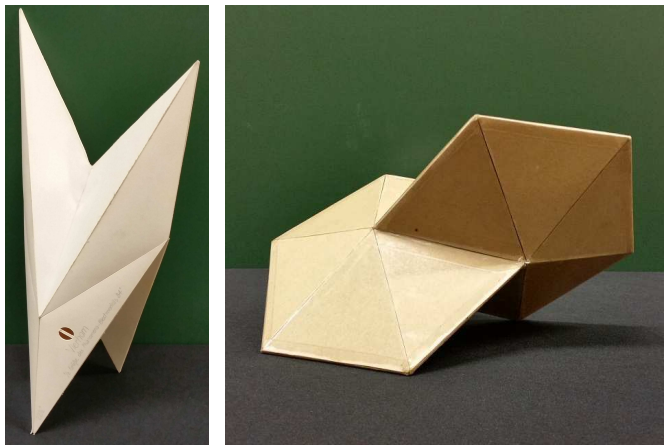
Snapping realization: It is *close* enough to another incongruent realization such that the physical model can snap into this neighboring realization due to non-destructive elastic deformations of material.

Open problem: The meaning of *closeness*.

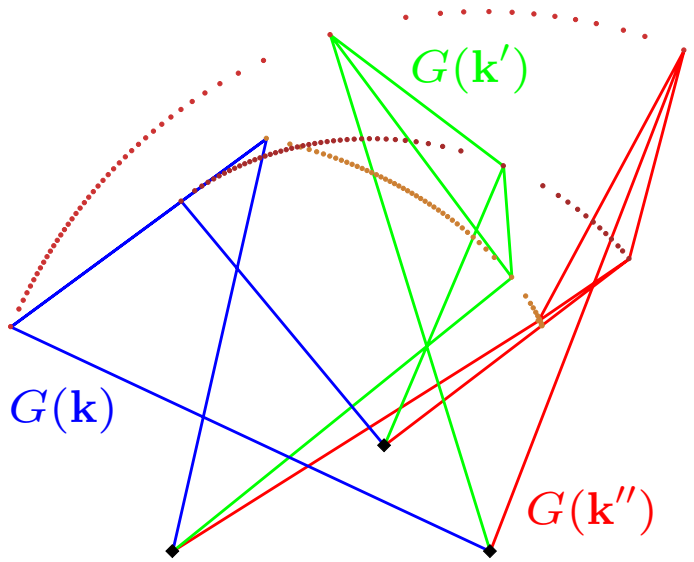


The evaluation of the snapping capability (shortly called *snappability*) of an undeformed realization $G(\mathbf{k})$ is based on the following result:

Theorem 1. If a framework snaps out of a stable realization $G(\mathbf{k})$ by applying the minimum strain energy needed to it, then the corresponding deformation of the realization has to pass a shaky realization $G(\mathbf{k}')$ at the maximum state of deformation. Such a snap of a framework ends up in a realization $G(\mathbf{k}'')$ which is either undeformed or deformed and shaky.

The snappability of an undeformed realization equals the elastic strain energy density of $G(\mathbf{k}')$.

Theorem 2. For an undeformed realization $G(\mathbf{k})$, which is not shaky, the singularity-distance equals the snappability.



Example. Pinned 3-legged planar parallel robot.

References. `arXiv:` 2001.04430 & 2003.09904