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Rubber bands, square tilings, and rational maps.

What are the different ways of tiling a rectangle by squares? If you make a graph out of rubber bands and stretch it, where do the vertices end up? These two questions turn out to have the same answer. This was used, for instance, in the 1940 solution to the "squared square" problem.

More generally, you can consider stretching a graph of rubber bands out on a groove network, or when one rubber band network is "looser" than another. This "looser" condition gives a new characterization of when a topological branched self-cover of the sphere is equivalent to a rational map. (Received June 04, 2014)