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Singularity confinement for the pentagram map

The pentagram map, introduced by R. Schwartz, is a birational map on the configuration space of polygons in the projective plane. We study the singularities of the iterates of the pentagram map. We show that a typical singularity disappears after a finite number of iterations, a confinement phenomenon first discovered by Schwartz. We provide a method to bypass such a singular patch by directly constructing the first subsequent iterate that is well defined on the singular locus under consideration. The key ingredient of this construction is the notion of a decorated (twisted) polygon, and the extension of the pentagram map to the corresponding decorated configuration space.