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Transfer of infinitesimal and finite rigidity among metrics

It is common to speak about shared properties, and differences, among Euclidean, spherical and hyperbolic spaces of the same dimension. In rigidity, it has been recognized for some time that infinitesimal rigidity or flexibility of a framework $G(p)$ can be transferred between Euclidean \mathbb{E}^d , spherical \mathbb{S}^d and hyperbolic \mathbb{H}^d spaces with the same underlying projective configuration P . We show some simple matrix operations (multiplication by invertible matrices) which carry out this transfer, and we will include Minkowski metric \mathbb{M}^d in the mix.

This transfer for infinitesimal rigidity raises the question of when finite rigidity, and global rigidity, also transfer. We describe some joint work with Bernd Schulze, based on symmetry, which provides transfer finite flexibility of a framework among the metrics. We also mention some results from work with Robert Connelly showing the transfer of generic global rigidity of a graph G among the same metrics.

All of these transfer results speak to an underlying, shared projective geometric theory of infinitesimal rigidity and static rigidity, and the way this implicit projective foundation threads through the wider theory of rigidity.

This is joint work with Franco Saliola.