Symmetric rigidity theory

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A bar-joint framework (G, p) is the combination of a finite simple graph $G = (V, E)$ and a map p assigning positions in Euclidean d-space to the vertices and hence lengths to the edges. The framework is flexible if there exists an edge-length-preserving continuous deformation of the vertices that does not arise from an isometry of the space. If no such deformation exists then the framework is rigid. In recent years many groups have extended rigidity theoretic results to symmetric frameworks. In particular we concentrate on the following question. Given a graph G with a non-trivial automorphism group and a framework (G, p) which is realised with the corresponding symmetry group, does there exist a deformation that preserves the symmetry of the framework? Detailed combinatorial characterisations of symmetric rigidity are known for a range of symmetry groups in the plane. After giving a gentle, but short, introduction to the subject I will report on joint work with Dewar, Grasegger and Kastis where we provide a variety of combinatorial results for symmetric frameworks in d-dimensions.

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