Experimentelle und konstruktive Algebra
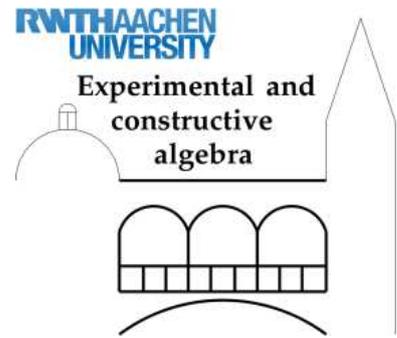
Experimental and constructive algebra

Kolloquiumsvortrag

Mittwoch, 17. Dezember 2014, 14:00 Uhr bis 15:30 Uhr, Hörsaal SeMath

BERND SCHULZE (UNIVERSITY OF LANCASTER, GROSSBRITANNIEN):
Rigidity and Flexibility of Symmetric Structures

Geometric Rigidity Theory is concerned with the study of bar-joint frameworks and related constraint systems of geometric objects. This area has a rich history which can be traced back to classical work of Euler, Cauchy and Maxwell on the rigidity of polyhedra and skeletal frames. The combinatorial side of the theory for generic structures began with Maxwell's counting conditions from 1864, and in 1970 Laman obtained the fundamental result that these necessary conditions are also sufficient for generic rigidity in the Euclidean plane. Combinatorial characterisations of generically rigid graphs in dimension 3 or higher have not yet been found. However, there exist significant partial results for the special classes of body-hinge, panel-hinge and molecular frameworks.

In this talk we consider the impact of symmetry on the rigidity properties of these structures. In particular, we present combinatorial characterisations of rigid symmetric frameworks which are as generic as possible subject to the given symmetry constraints. Extensions of these results to infinite frameworks with periodic or crystallographic symmetry are also discussed. This relatively new research area draws on the combinatorics of group-labeled quotient graphs and their associated matroids, symmetry-adapted Maxwell counting, and methods from group representation theory.

Since symmetry is ubiquitous in both man-made and natural structures, the potential for applications of these results is considerable.

Wir laden alle Interessierten herzlich ein.