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The Rigidity of Periodic Graphs

Zeolites are a type of molecule with a sieve-like structure where the "holes" of the sieve expand and contract. Using this as motivation, we study the rigidity properties of infinite periodic frameworks. We can think of such a framework in n dimensions as a multigraph embedded on an n-dimensional torus, where the torus may be of fixed or variable dimensions. We use the language of voltage graphs to describe this embedding, and we attempt to characterize the generic infinitesimal rigidity of infinite periodic frameworks by the properties of the underlying voltage graph. This talk presents such a characterization for frameworks on a fixed torus in 2 dimensions, and we outline what is known for graphs on a flexible torus.