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Dynamical Cell Complexes: Evolution, Universality, and Statistics

Abstract:

Many physical and biological systems are cellular in nature -- soap foams, biological tissue, and polycrystalline metals are but a few examples that we encounter in everyday life. Many of these systems evolve in a manner that changes their geometries and topologies to lower some global energy. We use computer simulations to study how mean curvature flow shapes cellular structures in two and three dimensions. This research touches on discrete geometric flows, combinatorial polyhedra and their symmetries, and the quantification of topological features of large cellular systems. If time permits, I will also describe some exact results in 1 dimension.