

Abstract:

The discrete p -Laplacian is defined on a graph similarly to the classical p -Laplacian on a domain or a manifold. Many asymptotic properties of the parabolic equation associated with the p -Laplacian on a domain depend on suitable Sobolev embeddings, which can be extended to the discrete case provided certain growth conditions are satisfied by the graph. It is well-known that these can in turn be described by isoperimetric inequalities. We are going to show that isoperimetric constants also play an important role in the description of the eigenvalues of the discrete p -Laplacian, and in particular of its spectral gap. Time regularity of the parabolic equation will also be investigated: in sharp contrast to the continuous case, for which only Hölder regularity is known, much stronger smoothing properties can be proved in the discrete case; remarkably, this smoothing effect depends on p .

This is based on joint work with Bobo Hua (Shanghai) and Matthias Keller (Potsdam).