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Computing graph p -Laplacian eigenpairs by a dynamical method

Graph p -Laplacian eigenpairs, and in particular the two limit cases $p = 1$ and $p = \infty$, reveal important information about the topology of the graph. Indeed, the 1-Laplacian eigenvalues approximate the Cheeger constants of the graph, while the ∞ -eigenvalues can be related to distances among nodes, to the diameter of the graph, and more generally to the maximum radius that allows to inscribe a given number of disjoint balls in the graph. We provide a characterization of the p -Laplacian eigenpairs in terms of constrained weighted linear Laplacian eigenpairs that can be computed by gradient flows for a family of energy functions. Moreover, we show that this approach is suitable to deal also with the degenerate case $p = \infty$.

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