Computing eigenvalues of the p-Laplacian via graph surgery on combinatorial graphs

Matthias Hofmann

Abstract

We develop a perturbation theory of the discrete signed p-Laplacian under perturbation by a cut parameter, developing a Hellman-Feynman type theorem for the derivative in the nonlinear setting $p \neq 2$. Using an approach based on graph surgery, we develop a model based on such a perturbation of the p-Laplacian on a cut graph to study the eigenvalue problem in the original setting. We show that the eigenvalues of the signed p-Laplacian can be characterized via extremal points of the constructed perturbed system. In this context, we elaborate on how graph surgery can be used in order to compute eigenvalues of the (signed) p-Laplacian by looking at some examples. Based on a joint work with Gregory Berkolaiko.