

DISCRETIZATIONS OF ANISOTROPIC PDES USING VORONOI'S REDUCTION OF QUADRATIC FORMS

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Anisotropy, which refers to the existence of preferred direction in a domain, is a source of difficulty in the discretization of partial differential equations (PDEs). For instance, monotone discretization schemes for anisotropic PDEs cannot be strictly local, but must use wide stencils. The same constraint holds for non-linear PDEs like the Monge-Ampere equation which are not uniformly elliptic. When the PDE is discretized over a Cartesian grid domain, one can often leverage matrix decomposition technique known as Voronoi's first reduction, so as find the best possible compromises in the design of anisotropic finite difference schemes. I will describe this tool and some recent extensions and applications in the field of optimal transport.