Approximating highly anisotropic functions with optimally transported meshes.

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ABSTRACT

A Moving Mesh Method, which combines equidistribution with optimal transport, will be presented. This method will be shown to produce an anisotropic mesh along a given feature by equidistributing a suitably chosen scalar monitor function. Furthermore, the general metric M, in physical space, that a mesh generated by this method aligns to, will be derived [1].

Numerical examples will demonstrate that optimally transported meshes are suitable for interpolating highly anisotropic functions and solving time dependent PDEs whose solutions are highly anisotropic functions. Furthermore, analysis of the error estimates and a comparison with those obtained for the optimal anisotropic mesh, will be presented.

REFERENCES

[1] Budd, C., Russell, R. and Walsh, E. *The geometry of r-adaptive meshes generated using optimal transport methods.* . Journal of Computational Physics, 282. pp. 113-137, (2015).