

# Quadrature formulas for functions defined on Riemannian manifolds

Frank Filbir  
Helmholtz Center Munich, Germany

In many practical applications, for example document analysis, semi-supervised learning, and inverse problems one is confronted with functions defined on a (Riemannian) manifold imbedded in a high dimensional ambient space. These functions have to be approximated by using only sampled values. Due to several restrictions (experimental setup etc.) we can hardly assume that the sampling nodes are located on a regular grid. This means we have to come up with an approximation process which, on the one hand, can work with scattered data and, on the other hand, has sufficiently good approximation rate. In this talk we will address both problems. We will show under which conditions good localized kernels on a manifold can be constructed and how such kernels can be used to solve the aforementioned problem.

The talk is based on joint work with Hrushikesh N. Mhaskar.

## References

- [1] F. Filbir, H. N. Mhaskar, *A quadrature formula for diffusion polynomials corresponding to a generalized heat kernel*, submitted 2009.
- [2] F. Filbir, H. N. Mhaskar, J. Prestin, *On a filter for exponentially localized kernels based on Jacobi polynomials*, to appear in J. Approx. Theory 2009.
- [3] M. Maggioni, H. N. Mhaskar, *Diffusion polynomial frames on metric measure spaces*, Appl. Comput. Harmon. Anal. 24 (2008) 329–353.