

# Bézier surface fitting on manifolds

Benedikt Wirth

Applied Mathematics, University of Muenster

`Benedikt.Wirth@uni-muenster.de`

Given a finite number of (potentially noisy) measurements depending on one or more independent variables, a classical data processing task is to approximate those measurements by a function of the independent variables. This function can be taken from a low-dimensional class (for instance the class of affine functions which leads to linear data fitting or regression) or can be chosen as the solution of a high- or infinite-dimensional optimization problem that balances smoothness properties of the function with fidelity to the data. An efficient mixture of both approaches is the use of Bézier functions (certain piecewise polynomial functions) with only a moderate number of defining parameters that can easily be optimized. In particular, such an approach allows to perform comparatively efficient data fitting for data from nonlinear spaces such as Riemannian manifolds. We will develop such an approach for bivariate (or general multivariate) data fitting which tries to reduce the number of necessary numerically nonlinear operations on the manifold to a minimum.

**Joint work with:** Pierre-Antoine Absil, Pierre-Yves Gousenbourger.