

Analyzing spatial and spatio-temporal data over complex multi-dimensional domains

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I will present a novel class of models for the analysis of data observed over complex multidimensional domains, including curved bi-dimensional domains and three-dimensional domains with non-trivial geometries. This class of models includes smoothing methods, regression methods and principal component analysis methods. The models are based on differential regularizations. The regularizing term can be used to incorporate problem specific knowledge of the phenomenon under study; moreover, it enables a very flexible modeling of anisotropy and non-stationarity. The methods are implemented using numerical techniques such as finite elements. The methods will be illustrated through various applications.