数学与系统科学研究院

计算数学所学术报告

报告人：**Prof. Franz-Erich Wolter**

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报告题目：

Shape and Image Cognition, Construction and Compression via Tools from Differential Geometry

邀请人：　　徐国良研究员

报告时间：**2011** 年 **7** 月 **26** 日（周二）

上午 **9：30-10：30**

报告地点：　　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

We shall describe how concepts from differential geometry especially from Riemannian geometry have been providing powerful tools creating major advances in geometric modeling, geometry processing and image analysis dealing with the topics presented in the title of this address. This talk includes a retrospective compiling contributions of the author`s works showing how concepts from local and global differential geometry have introduced new methods into geometric modeling and shape interrogation and classification finally ending with modern state of the art research on geometry processing and image processing.

A major part of this seminar starting with works in the late nineties at the author`s lab is dedicated to discussing how "efficient finger prints" useful for indexing and clustering digital data collections can be derived from spectra of Laplace operators being naturally associated with geometric objects such as surfaces and solids as well as (coloured) images including medical 2d- and 3d-images. Recently the latter works obtained particular attention in the area of medical imaging.

Next we focus on cut loci, the medial axis and its inverse in Euclidean and Riemannian worlds. This work starts with basic medial axis results presented by the the author in the early nineties when the medial axis was not considered as a main stream subject in the respective scientific communities. Those results state: The Medial Axis Transform can be used to reconstruct, modify and design a given shape ("Shape Reconstruction Theorem"). Under some weak assumptions the medial axis contains the essence of the topological shape of the geometric object as it is a deformation retract of the given shape ("Topological Shape Theorem"). Therefore the medial axis contains the homotopy type of the given shape. We present recent results showing how geodesic Voronoi diagrams, geodesic medial axis and its inverse can be computed in 3d- or higher dimensional Riemannian spaces. The "medial axis inverse" allows to construct a medial modeller providing efficient features for shape optimization with respect to shape dependent mechanical properties.

欢迎大家参加！