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Projekt

Projekttitle SemSeg – 4D Space-Time Topology for Semantic Flow Segmentation

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Thementyp Drittmittelprojekt

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Projekthomepage http://www.isg.cs.uni-magdeburg.de/visual/index.php?article_id=48&clang=0

Schlagwörter [Flow Visualization](#)

Kurzbeschreibung

The thorough analysis of flows plays an important role in many different processes, such as airplane and car design, environmental research, and medicine. Scientific Visualization and its subfield flow visualization have provided a variety of techniques for the domain experts to visually analyze large and complex flow data sets. Among them, so-called topological methods play an important role.

Vector field topology (VFT) is a mathematically rigorous theory that reveals the essential structure of a static vector field. However, this approach is only fully valid for static vector fields. Recent developments in the target domains of this project show a clear transition from steady to unsteady flow scenarios. Accordingly, we have to see that the traditionally proven approaches do not apply any more and that a conceptual change in the methodology of visual analysis is necessary. Topological methods which account for the complete dynamic behaviour of flow fields are strongly needed but do not exist. Steps toward this goal have been done from several sides, delivering promising but yet only partial results. It is the objective of this project to research a new segmentation method for unsteady flows that has the elegance and specificity of (steady) VFT, but which provides correct results for unsteady flows as well.


This project aims at the formulation of a sound theoretical mechanism to describe structural features in time-dependent flow. Similar to the case of steady flow, where topology has proven its usefulness in many years, it is straight-forward to expect that the new approach will also establish its important role in the analysis and discussion of time-dependent flow scenarios. As part of a successful project, concrete algorithms to extract and visualize the topological structures are derived from the new mechanism. Implementations of them will allow

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