


### 3.39 On the (Un)Suitability of Strict Feature Definitions for Uncertain Data


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We discuss strategies to successfully work with strict feature definitions such as topology in the presence of noisy data. To that end, some previous work from the literature is reviewed. Also, the concept of Separatrix Persistence is presented, which allows to quantify features - and thereby remove small-scale features induced by noise.

### 3.40 Multi-field Visualization for Biomedical Data Sets

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There is a multitude of data sets that include additional information other than velocity data. This presentation will discuss two examples of such data sets: medical and insect flight. Based on a CT angiogram data set, the geometry of the vessel boundary can be extracted and then used in order to compute the blood flow inside that geometry assuming an inflow velocity and pressure based on a typical heart rate. The visualization can then be extended by introducing wall-shear stresses mapped onto the geometry using color coding. Similarly, FTLE-based color coding is capable of highlighting similar areas compared to wall-shear stress. The other example included deals with a dragon fly. Using high-speed cameras, a dragonfly can be observed and its geometry reconstructed based on different views generated by a set of three cameras. Using this geometry, a CFD simulation then generates the flow around the dragonfly. Since additional data is computed alongside the flow, the flow can be studied and correlated to the lift generated by the individual wings of the dragonfly, allowing for more insight of the flight characteristics of the dragonfly.

### 3.41 Asymmetric Tensor Field Visualization from a Multi-Field Viewpoint

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Asymmetric tensor fields often arise as the gradient of a vector field, such as the velocity gradient tensor in fluid dynamics and the deformation gradient tensor in solid mechanics. Visualization of the vector field of interest and its gradient tensor field can provide greater insight than the visualization of the vector field only. This leads to a multi-field framework in vector field visualization. In addition, tensor decomposition implies that the behaviors of a tensor field is a direct result of the interaction of the components in the decomposition. This is another aspect of multi-field in tensor field visualization.

We also discuss future challenges and opportunities in tensor field visualization based on a multi-field framework.