



Contribution ID: 53

Type: **Contributed Talk**

## Vertex characterization via second-order topological derivatives

*Friday, 27 February 2026 09:50 (20 minutes)*

This talk focuses on identifying vertex characteristics in 2D images using topological asymptotic analysis. Vertex characteristics include both the location and the type of the vertex, with the latter defined by the number of lines forming it and the corresponding angles. This problem is crucial for computer vision tasks, such as distinguishing between fore- and background objects in 3D scenes. We compute the second-order topological derivative of a Mumford-Shah type functional with respect to inclusion shapes representing various vertex types. This derivative assigns a likelihood to each pixel that a particular vertex type appears there. Numerical tests demonstrate the effectiveness of the proposed approach.

This is a joint work with Peter Gangl and Otmar Scherzer.

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**Session Classification:** Stochastic Analysis and Topological Asymptotic Analysis