

# Differential-Based Geometry Modeling and Processing of Meshes

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With the unifying eye of integrability we will look at a diverse set of recent geometry processing algorithms. Several current geometry algorithms can be formulated as systems of first order PDEs on surface or volume meshes in a discrete differential geometric framework. This includes problems such as image and geometry retargeting, Laplacian modeling, surface and volume parametrization, minimal surface computation and many others.

The underlying mathematical techniques rely on a consistent discrete differential geometry framework including concepts such as discrete differential forms and discrete Hodge decomposition. Using several example problems we show that these integrability issues are fundamental for a wide range of local and global problems in geometry processing. Applications to various problems in scientific computing, computer aided design, architecture and computer graphics are shown.

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