Nuestro método simplifica el diseñode mallas de polígonos irregulares, generando una familia de formas parametrizable usando como suministro un conjunto de vértices que representan un bosquejo tosco del modelo deseado. Nuestro método es iterativo y converge hacia una versión continua y suave del modelo original.

A diferencia de los demás métodos, el nuestro permite utilizarmezclas de diferentes tipos de representación de manera adaptativa como triángulos ycuadrángulos, explotando las relaciones geométricas fundamentales facilitando la convergencia del algoritmo y garantizandoformas másparecidas y coherentes con la forma original frente a los otros métodos.

Nuestro método permite usar restricciones suaves ponderando el efecto de suavizado en cada vértice con base en un peso normalizado, los pesos son asignados a los vértices de control o de la malla original. Los pesos de los nuevos vértices resultantes de las iteraciones se calculan por medio de interpolación, permitiendo modificar el comportamiento del método sobreregiones exactas del modelo original.

Loop 1987

The method is based on a recursive subdivision process that refines the mesh into a piecewise linear approximation of a smooth surface. The rules which govern the mesh refinement are based on well-known properties of B-spline curve as well as more recent results from multivariate spline theory.

This analysis reveals that a surface generated by this method is curvature continuous except at a fixed number of extraordinary points corresponding to mesh vertices

DeRose 1998

Subdivision surfaces :smoothness of themodel is automatically guaranteed

Desbrun 1999

We compare our method to previous operators and related algorithms, and prove that our curvature and Laplacian operators have several mathematically-desirable qualities that improve the appearance of the resulting surface. we provide a series of examples to graphically and numerically demonstrate the quality of our results.

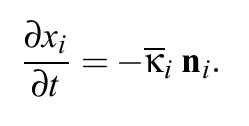
This suggests the use of implicit integration schemes which lead to unconditionally stable algorithms allowing for very large timesteps.

In the surface fairing literature, most techniques use constrained energy minimization. For this purpose, different fairness functionals have been used. The most frequent functional is the total curva-ture of a surface S :



Pure diffusion will, by nature, induce shrinkage

Curvature flow smoothes the surface by moving along the surfacenormal n with a speed equal to the mean curvature κ:



Reif 2000

Subdivision surfaces: their ability to model smooth surfaces of arbitrary topology

Jones 2003

Even with high-fidelity scanners, the acquired 3D models are invariably noisy

Isotropic diffusion: Taubin iterative diffusion process over a polygonal mesh that was efficient, simple, and energy-preservub (i.e., non-shrinking)

Isotropic diffusion : Desbrun The implicit solver leads to a more stable and efficient solution of the diffusion process. Use of curvature information (rather than vertex positions) prevents vertex drift in areas of the mesh that are sampled in an irregular fashion

Li2012

The basic idea is constructing the subdivision rule

for new inserted vertices of a new interpolatory subdivision scheme based on an

approximating subdivision algorithm applied to a local conﬁguration of the mesh with one

vertex updated for interpolation of the vertex.

liu 2008

Laplace–Beltrami operator and its discretization play a central role in the ﬁelds of image processing, computer graphics, computer aided geometric design and so on.

In these application areas, the objective surfaces to be processed are usually represented as discrete meshes. Hence, there are comprehensive needs in practice to discretize the LBO and the mean curvature normal H.

It is well-known that the most often used and studied meshes in surface processing are triangular and quadrilateral.

It is obvious that quadrilateral meshes can be processed as triangular meshes by subdividing each quadrilateral into two triangles. Hence, the discrete schemes of LBO over triangular meshes could be easily applied to quadrilateral ones. However, two ways of subdividing each quadrilateral into triangles often lead to different computational results even though the same discrete scheme is applied to the same quadrilateral. Therefore, it is necessary to construct a discrete scheme which can be used to compute the LBO and the mean curvature normal directly over quadrilateral meshes.

Ma 2005

Subdivision surfaces refer to a class of modelling schemes that define an object through recursive subdivision starting from an initial control mesh.

Botsch 2006

Subdivision surfaces [ZSD + 00] can be considered as a generalization of spline surfaces, since they are also controlled by a coarse control mesh, but in contrast to spline surfaces allow to represent surfaces of arbitrary topology.

As this constraint is not met by arbitrary surfaces, those would have to be remeshed to subdivision connectivity in a preprocessing step

**Hausdorff-distance**.

Mesh Lab

Vanraes 2006

The main advantage of this scheme is that we can choose the values of the normals in the initial vertices which results in more design possibilities

Yang 2006

A new subdivision scheme, normal based subdivision scheme, has been introduced for curve interpolation.

Alexa 2008

Generally, faces are subdivided by inserting new ver-tices and then the locations of old and new are updated. The update rules often are derived from analogies to spline surfaces. The basic schemes cover triangle and quad meshes and interpolate the vertex positions or approximate them providing a surface with better qual-ity