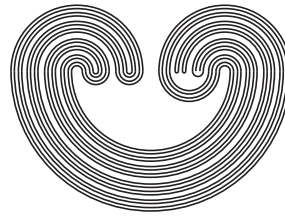


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TOPOLOGY PROCEEDINGS



Volume 61, 2023

Pages 239–267

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by

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Electronically published on November 7, 2022

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Auburn University, Alabama 36849, USA

E-mail: topolog@auburn.edu

ISSN: (Online) 2331-1290, (Print) 0146-4124

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SMOOTH NORMALS WITH BLOBS FOR SURFACES FROM 3D BINARY IMAGES

CINTHYA CEJA¹, CALEB RASCON², EDGAR GARDUÑO²,
BRUNO M. CARVALHO³, AND GABOR T. HERMAN⁴

ABSTRACT. One way of representing a real object on a computer screen is by rendering a polygonal mesh, extracted from the discretized version of the object. This discretization is typically a collection of abutting small cubic voxels. In this work, we present a method that generates better renderings of rectangular meshes (with desirable mathematical properties but blocky renderings) created by a boundary detection algorithm. We achieve this by assigning appropriate normals to the vertices of the mesh and taking advantage of how standard computer graphics methods render images. We assign the normals by evaluating, at the vertices of the mesh, the gradient of a linear combination of Kaiser-Bessel-based basis functions that are spherically symmetric. By using signal processing principles, we select the parameters of these functions and assign normals that yield renderings that show smoother surfaces than the renderings produced by the original voxel based models, without modifying the mesh geometry.

2020 *Mathematics Subject Classification.* Primary 54X10, 58Y30, 18D35; Secondary 55Z10.

Key words and phrases. Surface Rendering, Boundary Tracking, Smooth Normals, Implicit Surfaces, Spherically Symmetric Basis Functions, Generalized Kaiser-Bessel Functions, Linear Combination of Blobs.

Cinthya Ceja was supported by a CONACyT grant number 452510. Bruno Carvalho was supported by the following grants FAPERN/ CNPq PRONEM 610006/2010, CNPq Universal 486951/2012-0 and INCT-MACC.

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