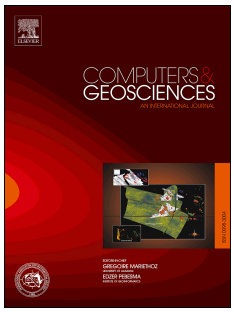
Accepted Manuscript



Iterative refinement of implicit boundary models for improved geological feature reproduction

Ryan Martin, Jeff Boisvert

PII: S0098-3004(16)30755-5

DOI: 10.1016/j.cageo.2017.07.003

Reference: CAGEO 3989

To appear in: *Computers and Geosciences*

Received Date: 5 December 2016

Revised Date: 17 May 2017

Accepted Date: 13 July 2017

Please cite this article as: Martin, R., Boisvert, J., Iterative refinement of implicit boundary models for improved geological feature reproduction, *Computers and Geosciences* (2017), doi: 10.1016/j.cageo.2017.07.003.

Iterative refinement of implicit boundary models for improved geological feature reproduction

Ryan Martin [a, b, c], Jeff Boisvert [a,b,d]

[a] *Center for Computational Geostatistics, Edmonton, Canada*

[b] *University of Alberta, Edmonton, Canada*

[c] *rdm1@ualberta.ca*

[d] *jbb@ualberta.ca*

Corresponding Author: Ryan Martin – rdm1@ualberta.ca – 1-780-887-3496

6-241 Donadeo Innovation Centre For Engineering,

9211-116 Street,

University of Alberta,

Edmonton, Alberta, Canada T6G 1H9

Abstract

Geological domains contain non-stationary features that cannot be described by a single direction of continuity. Non-stationary estimation frameworks generate more realistic curvilinear interpretations of subsurface geometries. A radial basis function (RBF) based implicit modeling framework using domain decomposition is developed that permits introduction of locally varying orientations and magnitudes of anisotropy for boundary models to better account for the local variability of complex geological deposits. The interpolation framework is paired with a method to automatically infer the locally predominant orientations, which results in a rapid and robust iterative non-stationary boundary modeling technique that can refine locally anisotropic geological shapes automatically from the sample data. The method also