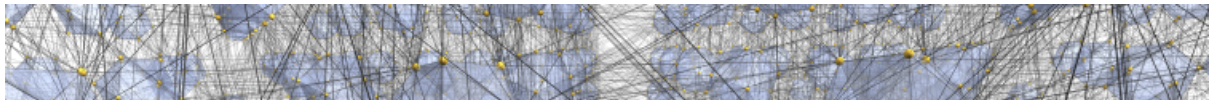


Algorithme de Lloyd dans l'espace périodique 3D

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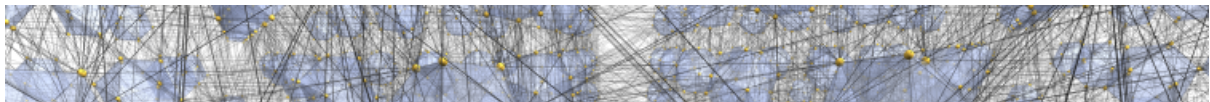


Sujet The general context of this research is described at
<http://www-sop.inria.fr/members/Monique.Teillaud/other-geometries/>

Lloyd's algorithm, or Voronoi relaxation, is used in several applications to compute centroidal Voronoi tessellations. Its convergence has been shown in one dimension. In higher dimensions, one of the problems is due to the fact that the studied domain has a boundary.

A package computing 3D periodic Delaunay triangulations has recently been integrated in CGAL, the Computational Geometry Algorithms Library. A demo of Lloyd's algorithm is available.

The work will consist in experimentally studying the convergence of Lloyd's algorithm in the 3D periodic setting, which avoids boundaries. The same experiments will be run with the optimal Delaunay triangulation. In both cases, the distribution of angles will be studied. Also, a possible convergence to some crystalline structures will be examined.



Références Publications are accessible at
http://www-sop.inria.fr/members/Monique.Teillaud/biblio/Keyword/OTHER_GEOMETRIES_.html
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* Manuel Caroli and Monique Teillaud. 3D Periodic Triangulations. In CGAL Editorial Board, editor, CGAL User and Reference Manual. 3.5 – 4.0 edition, 2009 – 2012.
* Manuel Caroli and Monique Teillaud. Delaunay Triangulations of Point Sets in Closed Euclidean d -Manifolds. In Proceedings 27th Annual Symposium on Computational Geometry, pages 274-282, 2011.
* Qiang Du, Maria Emelianenko, and Lili Ju. Convergence properties of the Lloyd algorithm for computing the centroidal Voronoi tessellations, SIAM J. Numer. Anal., 44(1):102-119, 2006.
* L. Chen and J. Xu. Optimal Delaunay triangulations. Journal of Computational Mathematics, 22(2):299-308, 2004.

Prérequis Connaissances à la fois en géométrie, en algorithmique, et en C++.