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Nationality : french
Born : may 5, 1984.

Education

2007– End 2010 : Ph student in the Laboratory of Mathématiques, Image et Applications in La Rochelle, France under the direction of Guy Wallet, Eric Andres and Laurent Fuchs. Subject : *Formalismes non classiques appliqués au traitement informatique de la topologie et de la géométrie discrète.*

2005–2007 : Master "Mathématiques, Image et Applications" at La Rochelle university.

2004–2005 : Licence of "Image, Mathématiques et Applications à l'Economie" at La Rochelle university.

2002–2004 : Preparatory Classes for High Schools at Dautet secondary school in La Rochelle .

Fields of Research and Results

We study the transition from the discrete to the continuous world in order to gain understanding of fundamental aspects of **discrete geometry**. Geometrical objects usually have a natural definition in the continuous world while it is difficult to find discrete analogous notions. Moreover, the computer treatment of these issues justifies the search of a **constructive mathematical** framework which offers an exact control of computations and an easy implementation.

From this double point of view, there exists an interesting numerical system because it is **both discrete and continuous** and it seems relatively constructive : this is the so called Harthong-Reeb line which leads to the definition of the discrete analytical line by J.P. Reveillès.

Initially, we proposed a rigorous construction of the Harthong-Reeb line using a minimal form of **nonstandard analysis**. We described a **process of arithmetization** of continuous functions and we studied the constructive content of this system [1,2].

Subsequently, we improved the constructive property of this numerical system by substituting the number theory of Laugwitz and Schmieden by usual nonstandard analysis. The new approach of the arithmetization process leads to the introduction of a **discrete multi-resolution representation** of continuous functions [3,4].

Our third step was to transfer these different notions in the **Constructive Type Theory** of Martin-Lof. The use of this framework, at the boundary between mathematics, logic and computer science, will guarantee a direct implementation in a high level computer language like Coq.

An interesting consequence of our work on the Harthong-Reeb line is that this new numerical system appears as a new model of the **constructive continuum**.

Our programs are developed on a **functional language** OCaml. In parallel of the theoretical studies of the constructive content of our models, we prove with the formal proof management system **Coq** the validity of our proofs.

Publications

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5. *Formalizing a Discrete Model of the Continuum in Coq from a Discrete Geometry Perspective.* N. Magaud, A. Chollet, L. Fuchs (to be published in ADG'10 conference)

4. *Ω-Arithmetization of elipse.* A chollet, G Wallet, E Andres, L Fuchs, G Largetau-Skapin, A Richard in CompImage, 2010, LNCS

3. *Ω-Arithmetization : a Discrete Multi-resolution Representation of Real Functions.* A Chollet, G Wallet, L Fuchs, E Andres, G Largeteau-Skapin, Springers's LNCS Volume 5852 for IWCIA conference, 2009 (Best Student Paper)

2. *Insight in discrete geometry and computational content of a discrete model of the continuum.* Chollet, A., Wallet, G., Fuchs, L., Largeteau-Skapin, G., Andres, E. Pattern recognition , vol 42, num 10, october 2009 (Journal)

1. *A first look into a formal and constructive approach for discrete geometry using nonstandard analysis.* Fuchs, L., Largeteau-Skapin, G., Wallet, G., Andres, E., Chollet, A. DGCI 2008, 21-32

Collaborations and communications

– Laboratory Mathematiques, Image et Application (La Rochelle) : **Guy Wallet** (thesis supervisor)
– Laboratory Signal Images et Communications-XLim (Poitiers) : **Eric Andres** (thesis supervisor), **Laurent Fuchs** (scientific supervisor), **Gaelle Largeteau-Skapin** (scientific supervisor)
– Laboratory Sciences de l'Image, de l'Informatique et de la Télédétection (Strasbourg) : **Nicolas Magaud** (collaboration about the proof assistant Coq)

TALKS :
– Sophia Antipolis (Fr), Inria, in Galapagos ANR : *Arithmétiques nonstandard pour la définition d'un espace discret/continu*, 10/12/09
– Playa Del Carmen (Mx), IWCIA conference, *Ω-Arithmetization : a Discrete Multi-resolution Representation of Real Functions*, 22/10/09
– Strasbourg (Fr), seminary in the laboratory of Sciences de l'Image, de l'Informatique et de la Télédétection *Formalismes non classiques appliqués à la construction de droites discrètes-continues* 04/06/09
– Clermont-Ferrant (Fr), PH student school about Mathematic computer science : *Construction d'une droites discrètes-continues à partir de formalismes nonclassiques*, 9/04/09
– Saint-Die des Vosges (Fr), Working group in Discrete Geometry *L'origine des droites discrètes de J.P. Reveillès*,09/11/07
– Poitiers (Fr), Laboratory Signal Images et Communications-XLim : 5 talks in the "Informatique graphique" team between 2007 and 2010
– 3 interventions for scientific meeting of federations (PRIDES and PPFGIC) of laboratories (universities of La Rochelle, Limoges and Poitiers) (between 2007 and 2010)

Vocational training research

- **From january until july 2007** : « Sur les Droites discrètes », G. Wallet, E. Andres, laboratories MIA of La Rochelle and SIC-XLIM of Poitiers
- **From may until june 2006** « Les hyperréels », G. Wallet, laboratory MIA of La Rochelle
- **From september until december 2005** « Extension du théorème centrale limite » J.C. Breton, laboratory MIA of La Rochelle

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Teaching

- **Mathematics** : for Génie Civil students in licence 1, university of La Rochelle (2009-2010). (33H)
- **Géomatique** for geographer students in licence 2, university of La Rochelle (responsible for lessons) (2009-2010). (36H)

Skills / Interests

- **Administrative / Associative responsibilities** :
  - Member of the Scientific Council of La Rochelle university (2010-).
  - Representative of the Ph students of La Rochelle for the SPI&A doctoral school (2007-2009).
  - Since 2007, main organizer of a video festival about scientific vulgarization in ADocs (Ph studients association of La Rochelle)
  - Important responsibilities or participations for several associations acting for the access to education
- **Languages :**
  - French (mother language)
  - English (read and speech)
  - Spanish (conversation language)
- **Hobbies** :
  - Music (playing flute since six years old)
  - Travels, foreign culture (Lebanon, Norway, United Mexican States, Romania, Spain, Italy, England, ...)