

Tim Hosgood

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Current research

Defining Chern classes in Hodge and Deligne (i.e. holomorphic) cohomology for coherent sheaves on paracompact complex-analytic manifolds using twisting cochains and simplicial methods. Following on from work by Brylinski and McLaughlin; Grivaux; O’Brian, Toledo, and Tong; and Green.

Research interests

Homotopy theory, homotopy type theory, (higher) category theory, quantum computing.

Education

2016 –
Université d’Aix-Marseille

Doctorat (en Mathématiques)
under Julien Grivaux and Damien Calaque.

2012 – 2016
University of Oxford

MMath (Masters in Mathematics), BA Mathematics
First class honours, upper second-class honours (resp.).

2006 – 2012
Kingsley School, Bideford

A-Levels, GCSEs
Maths, Further Maths, Music (A*), French, Spanish (A)

Papers

arxiv.org/abs/1604.02441

An introduction to varieties in weighted projective space
Weighted projective space arises when we consider the usual geometric definition for projective space and allow for non-trivial weights. Using the Riemann-Roch theorem to calculate $\ell(E, nD)$ where E is a non-singular cubic curve inside \mathbb{P}^2 and $D = p \in E$ is a point we obtain a non-negatively graded ring $R(E)$ by taking the direct sum of the $\mathcal{L}(E, nD)$ for $n \geq 0$. This gives rise to an embedding of E inside the weighted projective space $\mathbb{P}(1, 2, 3)$. The main result of this paper is a reasonably simple degree-genus formula for non-singular ‘sufficiently general’ plane curves, proved using not much more than the Riemann-Hurwitz formula.

arxiv.org/abs/1609.00920

Death and extended persistence in computational algebraic topology

The main aim of this paper is to explore the ideas of persistent homology and extended persistent homology, and their stability theorems, using ideas from [Bubenik and Scott, 2014; Cohen-Steiner, Edelsbrunner, and Harer, 2007; and Cohen-Steiner, Edelsbrunner, and Harer, 2009], as well as other sources. The secondary aim is to explore the homology (and cohomology) of non-orientable surfaces, using the Klein bottle as an example. We also use the Klein bottle as an example for the computation of (extended) persistent homology, referring to it throughout the paper.

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Under Spec \mathbb{Z} – a reader’s companion

Master’s dissertation. The aim of this paper was to translate the first few sections (dealing with establishing the formalities of the subject) of [Toën and Vaquié, 2005] into English; to provide ample editorial commentary concerning the translation and historical context; and to comment on the mathematics in the paper, providing enough background information for the new reader to be able to follow the main ideas. The main emphasis is placed on this last point.

Conference and seminar talks

2019 Twisting cochains and twisted complexes

Young Topologists Meeting, Lausanne.

2018 Des méthodes simpliciales pour la géométrie complexe

Séminaire de l’équipe AGT d’Aix-Marseille.

2017 Les classes de Chern des fibrés vectoriels dans la cohomologie de Hodge

Séminaire Géométrie Complexe.

Teaching

Université d’Aix-Marseille

2018 – 2019

Maths en anglais. *3rd-year undergraduates, English*

Real analysis (Heine-Borel, Bolzano-Weierstrass, etc.); helping French students to improve their mathematical English.

Calcul différentiel. *2nd-year undergraduates, French*

Basic topology and multivariable calculus.

2017 – 2018

Algèbre linéaire. *2nd-year undergraduates, French*

Vector spaces, linear maps, eigenspaces, Jordan normal form.

Kingsley School, Bideford

2013

Further Mathematics A-Level. *Sixth-form, English*

FP1, FP2, D2 (Edexcel).

Other professional experience

2016

**Hertford College,
University of Oxford**

IT Technician

Led site-based IT development and network infrastructure upgrades. Managed staff and student help desk, with responsibilities including hardware repair and software support. Improved various registration systems with shell-scripting automation.

2014

Metaswitch, Cambridge

Network Functions Virtualisation Intern

Worked as part of the NFV team on the Virtual Route Reflector. Researched and presented information to the whole team on various aspects of network configuration management (e.g. NETCONF, TACACS+) before implementing them. Set up test systems for aforementioned aspects, as well as others. Gained experience with C, Bash, and Python. Completed an Effective Communications course, as well as a three-day hackathon.