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#### A. 研究概要

正標数のスムーズな多様体上のエタール層に対し, Beilinson が特異台を余接束上に構成した. これを使って, 特性サイクルを余接束上に定義し, Milnor 公式, 指数公式, 横断的な射による引きもどしなどの性質をみたくを証明した. 指数公式を使って外部積との両立性と  $\ell$  非依存性も導いた. 曲面からのプロパー射との両立性も証明した.

For an étale sheaf on a smooth variety over a perfect field of positive characteristic, using the singular support recently defined by Beilinson, I defined the characteristic cycle as a cycle on the cotangent bundle and proved the Milnor formula, the index formula, the compatibility with the pull-back by properly transversal morphisms etc. The article on these results is submitted for publication.

I proved that the characteristic cycles are compatible with exterior product and are independent of  $\ell$ , using the index formula. I also proved the compatibility with proper push-forward for morphisms from surfaces.

#### B. 発表論文

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2. K. Kato and T. Saito “Ramification theory for varieties over a local field,” Publications Mathematiques, IHES. 117, Issue 1 (2013), 1-178
3. T. Saito “The second Stiefel-Whitney classes of  $\ell$ -adic cohomology,” Journal für die reine und angewandte Mathematik, (2013), Issue 681, 101-147.
4. T. Saito “The determinant and the discriminant of a hypersurface of even dimension,” Mathematical Research Letters. 19 (2012), no. 04, 855-871
5. T. Saito “Ramification of local fields with imperfect residue fields III”, Mathematische Annalen, 352, Issue 3 (2012), 567-580.
6. A. Abbes and T. Saito “Ramification and cleanliness”, Tohoku Mathematical Journal, Centennial Issue, 63 No. 4 (2011), 775-853.

#### C. 口頭発表

1. The characteristic cycle and the singular support of an étale sheaf, Workshop of arithmetic geometry in Tohoku, October 30, 2014. 13:30-14:20 (日本). Arithmetic and Algebraic Geometry (Shioda 75), UTokyo, School of Math. Sci., Lecture hall, January 31, 2015, 11:20-12:20, (日本). Séminaire Théorie des Nombres, Institute de Mathématique de Bordeaux, mars 20, 2015, 14h00-15h00. Arithmetic Algebraic Geometry, May 15, 2015, 9:30-10:30 (中国). Nordic Number-theory Network, Copenhagen June 16, 13:15-14:05 (デンマーク). Géométrie arithmétique, théorie des représentations et applications, 24 juin 2015, 10h30-11h30 (フランス). Guest seminar, Freie Universität Berlin, June 30 12:30-14:00 16:00-17:30, July 2 14:15-15:45, July 7 12:00-13:00. AMS algebraic geometry summer institute, July 27, 2015, 3:20-4:10 (アメリカ). Conference on Algebraic Number Theory, TSIMF Sanya, January 17, 2016, 9:00-10:00 (中国).
2. On the characteristic cycle of an  $l$ -adic sheaf, Journées de géométrie arithmétique de l’IHÉS 25-26 septembre 2014 IHÉS (フランス), 25 10h30-11h30, 14h00-15h00, 26 10h30-11h30.
3. 1 進層の分岐と特性多様体、第三回九州合同セミナー 2014 年 1 月 11 日 佐賀大学, Characteristic cycles of a constructible sheaf on a surface, Arithmetic and Algebraic Geometry 2014, 東大数理大講義室 2014 年 1 月 29 日, Conference on Motives and Galois groups on the occasion of Uwe Jannsen’s 60th birthday, March 12 14:00-15:00, 2014, University of Regensburg (ド

- イツ). Geometry and Arithmetic of Surfaces, March 18 10:00-11:00, 2014 LMU and TU Munich(ドイツ).
4. The monodromy weight conjecture and perfectoid spaces (after Peter Scholze), VIASM Annual Meeting 2013, Hanoi, July 20-21, 2012. (ヴェトナム)
  5. Wild ramification and the cotangent bundle, 25/01/13 KIAS number theory seminar, 20/02/13 IPMU Inter-disciplinary Colloquium, 13/03/13 IHES Seminaire de mathematiques, 19/03/13 ENS a Lyon, 03/07/13 AMC 2013, Busan, 24/07/13 PANT (Pan Asia Number Theory) conference, VIASM, (ヴェトナム)
  6. Introduction to wild ramification of schemes and sheaves, Arizona Winter School 2012: Ramification and Geometry March 10-14, 2012, University of Arizona in Tucson (アメリカ) Uni Padova March 19-30, 2012
  7. Discriminant and determinant of a hypersurface of even dimension, 2011年7/27(水)代数学コロキウム 東大数理 123教室, 仙台シンポジウム 2011年8/2(火)、Une apres-midi de Geometrie Arithmetique a l'IHES 12 septembre, 2011, (フランス) 2011 Japan-Taiwan Mini workshop on Arithmetic Algebraic Geometry and related topics, Nov. 17-19. (台湾) Number theory seminar, University of Chicago, 2012 Jan. 18, Arithmetic and Algebraic Geometry 2012 Univ. of Tokyo, 2012 Feb. 17. (日本)
  8. Second Stiefel-Whitney class of  $\ell$ -adic cohomology, 東北大学代数学幾何セミナー、2011年1月14日(金) Geometrie Arithmetique et motivique, CIRM, 19 septembre 2011. (フランス) Galois Representations and Arithmetic Geometry, Institut de Mathematiques de Bordeaux, 15:15-16:15, July 11 2012. Orsay, 26-03-2013, (フランス)
  9. An  $\ell$ -adic Riemann-Roch formula (joint work with Kazuya Kato), Geometric Lang-
- lands seminar, University of Chicago, 2012 Jan. 16,
- D. 講義
1. 数理科学基礎 (教養学部前期課程講義): 微積分と線形代数の初歩.
  2. 微分積分学 (教養学部前期課程講義): 微積分.
  3. 数学続論 XF, 数物先端科学 III (数理大学院・4年生共通講義): エタール層の特性サイクル.
- E. 修士・博士論文
1. (博士) 寺門康裕 (TERAKADO Yasuhiro): The determinant and the discriminant of a complete intersection of even dimension
  2. (博士) 谷田川友里 (YATAGAWA Yuri): Characteristic cycle and ramification of a rank 1 sheaf
  3. (修士) 清水俊也 (SHIMIZU Toshiya): 単項付値環における分岐理論について
- F. 対外研究サービス
1. 第15, 16回高木レクチャー 6月27, 28日, 11月28, 29日オーガナイザー
  2. 玉原数論幾何研究集会2015, 6月2日(火)-6月5日(金) オーガナイザー
  3. Géométrie arithmétique, théorie des représentations et applications, 22 au 26 juin 2015, Centre International de Rencontres Mathématiques (CIRM), Luminy, France. オーガナイザー
  4. Documenta Mathematica, エディター
  5. Japanese Journal of Mathematics, エディター