Lecture Notes in Mathematics

Edited by J.-M. Morel, F. Takens and B. Teissier

Editorial Policy
for the publication of monographs

1. Lecture Notes aim to report new developments in all areas of mathematics and their applications- quickly, informally and at a high level. Mathematical texts analysing new developments in modelling and numerical simulation are welcome.

   Monograph manuscripts should be reasonably self-contained and rounded off. Thus they may, and often will, present not only results of the author but also related work by other people. They may be based on specialised lecture courses. Furthermore, the manuscripts should provide sufficient motivation, examples and applications. This clearly distinguishes Lecture Notes from journal articles or technical reports which normally are very concise. Articles intended for a journal but too long to be accepted by most journals, usually do not have this "lecture notes" character. For similar reasons it is unusual for doctoral theses to be accepted for the Lecture Notes series, though habilitation theses may be appropriate.

2. Manuscripts should be submitted (preferably in duplicate) either to Springer's mathematics editorial in Heidelberg, or to one of the series editors (with a copy to Springer). In general, manuscripts will be sent out to 2 external referees for evaluation. If a decision cannot yet be reached on the basis of the first 2 reports, further referees may be contacted: The author will be informed of this. A final decision to publish can be made only on the basis of the complete manuscript, however a refereeing process leading to a preliminary decision can be based on a pre-final or incomplete manuscript. The strict minimum amount of material that will be considered should include a detailed outline describing the planned contents of each chapter, a bibliography and several sample chapters.

   Authors should be aware that incomplete or insufficiently close to final manuscripts almost always result in longer refereeing times and nevertheless unclear referees' recommendations, making further refereeing of a final draft necessary.

   Authors should also be aware that parallel submission of their manuscript to another publisher while under consideration for LNM will in general lead to immediate rejection.

3. Manuscripts should in general be submitted in English. Final manuscripts should contain at least 100 pages of mathematical text and should always include

   - a table of contents;
   - an informative introduction, with adequate motivation and perhaps some historical remarks: it should be accessible to a reader not intimately familiar with the topic treated;
   - a subject index: as a rule this is genuinely helpful for the reader.

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Lecture Notes in Mathematics 1849

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Heegner Modules and Elliptic Curves

Springer

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Library of Congress Control Number: 2004107464

Mathematics Subject Classification (2000):
11F52, 11G05, 11G09, 11G15, 11G40, 11R58, 14F20, 14G10, 14H52, 14J27, 14K22

ISSN 0075-8434
ISBN 3-540-22290-1 Springer Berlin Heidelberg New York
DOI: 10.107/b98488

Springer is a part of Springer Science + Business Media
springeronline.com

Printed in Germany

Typesetting: Camera-ready TEX output by the authors

41/3142/du - 543210 - Printed on acid-free paper

Preface

In this text, we define the Heegner module of an elliptic curve over a global field. For global ground fields of positive characteristic, Drinfeld proved that certain elliptic curves are the images of Drinfeld modular curves. On these modular curves are points corresponding to Heegner points on classical modular curves. These points, called Drinfeld-Heegner points, correspond to generators of the Heegner module of the elliptic curve. Furthermore, for the case of a Weil elliptic curve over the rational field $\mathbb{Q}$, the Heegner module of the curve is generated by the corresponding Heegner points.

The cohomology of the Heegner module of an elliptic curve over a global field induces elements in the cohomology of the elliptic curve. As an application, we prove the Tate conjecture for a class of elliptic surfaces over finite fields. This case of the Tate conjecture is essentially equivalent to the conjecture of Birch and Swinnerton-Dyer for a corresponding class of elliptic curves over global fields and is also equivalent to the finiteness of the Tate-Shafarevich groups of these elliptic curves. This application is parallel to V.A. Kolyvagin's proof of the conjecture of Birch and Swinnerton-Dyer for a class of Weil elliptic curves over the field of rational numbers.

Paris, March 2004 *M.L. Brown*

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