

MATHEMATICS SEMINAR
of the
UNIVERSITY OF LUXEMBOURG
in cooperation with the
LUXEMBOURG MATHEMATICAL SOCIETY

December 2007

12 December 2007, at 2 pm

Room 2.04 bs

Jean-Marie Couveignes
University of Toulouse 2

Rational torsion classes in the Picard group of algebraic curves and the computation of modular Galois representations

Abstract

Take a prime ℓ and a finite field F_q with characteristic $p \neq \ell$ and a curve C over F_q . Let J/F_q be the Jacobian of C . We want to compute a basis (g_1, \dots, g_r) for $J/F_q[\ell]$, the rational part of the ℓ -torsion in J . Each g_i is given as a divisor on C in the corresponding class. I will show how to solve this problem in probabilistic polynomial time in $\log q$ and the genus of C . I will explain why this is useful for computing Galois representation attached with modular forms with even weight and the coefficients of these forms, following the program developed by Edixhoven to answer a question raised by René Schoof.

Please note that this talk—jointly organized by the LACS and the IMATH—will be given on **Wednesday at 2 pm**, in room **2.04 bs**.

18 December 2007, at 5 pm

Room 3.04 bs

Willy Sarlet
Ghent University

Decoupling second-order ordinary differential equations

Abstract

The general field for this talk is *applied differential geometry* and more particularly the *geometry of second-order dynamics*.

I shall start from the following concrete question: given an arbitrary (coupled) system of second-order differential equations, how can we figure out whether it is possible to change coordinates in such a way that the transformed equations decouple into single equations? To tackle this question, one needs to know about general tangent bundle geometry and the geometry of second-order equation fields. It will be argued that efficient tools for studying geometrical aspects of second-order dynamics are provided by the calculus of derivations of forms along the tangent bundle projection $\tau : TM \rightarrow M$. After a brief survey of this theory, which involves various notions of connections, I will present the full solution of the separability question. Finally, if time permits, I will briefly dwell on some related issues, such as the ‘separable case’ in Douglas’s treatment of the inverse problem of the calculus of variations, and recent work on so-called ‘submersive cofactor systems’.