

Meeting: 1003, Atlanta, Georgia, SS 14A, AMS Special Session on D-Modules, I

1003-11-1129 **J. Denef*** (Jan.Denef@wis.kuleuven.ac.be), Department of Mathematics, CelestijnenLaan 200B, Leuven, Belgium, and **F. Vercauteren** and **W. Castryck**. *Computing Zeta Functions of Curves over Finite Fields*.

We explain an algorithm to calculate the zeta function of a curve of genus g over a field with p^n elements, where p is small and gn is large. The method follows the approach of Kedlaya, who treated the case of hyperelliptic curves in characteristic different from 2. It is based on calculating the trace of Frobenius on Monsky-Washnitzer cohomology. The algorithm has been implemented by F. Vercauteren in the programming language C in the special case of C_{ab} curves. These are smooth affine curves with Newton Polygon a triangle with vertices $(0, 0)$, $(0, a)$, $(b, 0)$ and $\gcd(a, b) = 1$. In this case the time complexity is $O(g^5 n^3)$, neglecting logarithmic factors. For $p = 2, g = 4, n = 40$, the calculation takes about 2 hours on a PC. (Received October 04, 2004)