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Distribution of Class Numbers of Function Fields

The class number h of an algebraic function field $K/\mathbb{F}_q(t)$ can be found in a two stage process. First, an approximation E of h is computed, together with a bound U on the error $|h-E|$. Here, E can be obtained from a truncated Euler product of the zeta function of K, and U is a bound on the tail of the Euler product. Then a search for h in the interval $[E-U, E+U]$ is conducted using a baby step giant step or Pollard kangaroo method. This second phase of the algorithm can be sped up considerably if the distribution of the class number in the search interval is known. For degree two extensions $K/\mathbb{F}_q(t)$, i.e. elliptic and hyperelliptic function fields, this distribution is understood, but nothing is known for higher degree extensions. Nevertheless, one can still estimate the average value of $|h - E|/U$ numerically and use it to speed up class number computation.

This is joint work with Eric Landquist (Kutztown University, Pennsylvania) and Andreas Stein (University of Oldenburg, Germany).