# Effective equidistribution of eigenvalues of Hecke operators

Ram Murty
`murty@mast.queensu.ca`
*Department of Mathematics*
*Queen's University*
*99 University Avenue*
*Kingston, Ontario K7L 3N6*
*Canada*

**Abstract**

Fix a prime $p$ and consider the space of cusp forms $S(N, k)$ of weight $k$ and level $N$, with $N$ coprime to $p$. In 1995, Serre showed the existence of a measure $F(p)$ with respect to which the eigenvalues of the $p$-th Hecke operator acting on $S(N, k)$ are equidistributed as $k + N$ tends to infinity. We will derive an effective version of Serre's theorem and apply it to study the factorization of $J_0(N)$ into simple abelian varieties.

Our methods can also be applied to study the variation of eigenvalues of the Frobenius automorphism acting on a family of curves mod $p$ and the variation of eigenvalues of adjacency matrices of regular graphs.

*This is joint work with Kaneenika Sinha.*