Fourier Expansions of Modular Forms on Finite Upper Half Planes

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L01 Carson Hall, 4:00 pm
(Tea 3:30 pm Math Lounge)

Abstract

I will report on some joint work with Anthony Shaheen. First I will discuss the finite upper half plane H_q attached to a finite field F_q with q elements and compare it to the usual Poincare upper half plane. Here $q = p^n$, and I assume that the prime p is odd and that $n > 1$. A reference is Terras, Fourier Analysis on Finite Groups and Applications, Cambridge, 1999. The group $G = GL(2; F_q)$ (2x2 non-singular matrices with entries in F_q) acts on H_q by fractional linear transformation. A finite analogue of a modular form is a complex-valued function on H_q with an invariance property under the action of $GL(2; F_p)$ - the subgroup of G which is our analogue of the modular group. The talk will then discuss Fourier expansions of finite analogues of Maass-type Eisenstein series for $SL(2; F_p)$ and $GL(2; F_p)$. For Maass wave forms on the ususal Poincare upper half plane, these Fourier expansions involved K-Bessel functions. In the finite case they involve Kloosterman sums.

This talk should be accessible to undergraduates.