Algebra
Seminar

Modules for subgroups of M_{24} with meromorphic trace functions

Lea Beneish
Emory

Abstract: We give vertex operator algebra constructions of infinite-dimensional graded modules for certain subgroups of M_{24}. We begin by proving the existence of a module for M_{24}, whose trace functions are weight two quasimodular forms. Existence of this module implies certain divisibility conditions on the number of $\mathbb{F}_p$ points on Jacobians of modular curves. We write similar expressions which we show are trace functions for modules of cyclic groups with arbitrary prime order. These expressions can be modified so we can give a vertex operator algebra construction for these modules. However, this modification comes at the expense of any relationship to Jacobians of modular curves. By adding a term to the quasimodular forms, we obtain meromorphic Jacobi forms and prove the existence of a module for M_{24} with these trace functions. For certain subgroups of M_{24}, we give a vertex operator algebra construction for a module with these trace functions. In particular, these module constructions give an explicit realization of the relationship between the trace functions and divisibility conditions the number of $\mathbb{F}_p$ points on Jacobians of modular curves.

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