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Cohomology of congruence subgroups of $SL_3(Z)$ and real quadratic fields

Given the congruence subgroup $\Gamma = \Gamma_0(N)$ of $SL_3(Z)$ and the real quadratic field $E = Q(\sqrt{d})$, we compare the homology of Γ with coefficients in the Steinberg modules of E and Q. This leads to a connecting homomorphism whose image H is a "natural" (in particular Hecke-stable) subspace of $H^3(\Gamma, Q)$. The units $O_E^\times$ are the main ingredient in the construction of elements of H. We performed computations to determine H for a variety of levels $N \leq 169$ and all $d \leq 10$. On the basis of the results we conjecture exactly what the image should be in general. This is joint work with Dan Yasaki.