

Siegel modular forms of weight two and Hurwitz quaternion

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Abstract. Let \mathcal{H} denote the Hurwitz quaternion ring. The primary purpose of this talk is to compute the number of Hurwitz quaternion pairs with fixed norms and trace, that is,

$$\rho(n, m, r) := \#\{(\alpha, \beta) \in \mathcal{H} \times \mathcal{H} \mid N(\alpha) = n, N(\beta) = m, \text{Tr}(\alpha\bar{\beta}) = r\}.$$

We will construct a holomorphic Siegel modular forms of weight two on a congruence subgroup, and show its Fourier coefficients are the numbers $\rho(n, m, r)$, which involve the Hurwitz class number. In fact, the construction of the holomorphic Siegel modular forms of weight two is of independent interest.