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Hilbert modular generating functions with coefficients in intersection homology

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Abstract

In a famous paper, Hirzebruch and Zagier considered families of homology classes $\{Z_m\}_{m\in\mathbb{Z}_{\geq 0}}$ on certain Hilbert modular surfaces and showed that the generating series $\sum_{n=0}^{\infty} Z_m \cdot Z_n q^n$ are elliptic modular forms with nebentypus. This work can be seen as giving a geometric interpretation of the Doi–Naganuma lifting.

We prove the modularity of analogous generating series in the context of intersection homology classes on the product of two Hilbert modular varieties of arbitrary dimension or a single Hilbert modular variety of arbitrary dimension. The later case is a work in progress with M. Goresky.