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Periods of Modular Forms on $\Gamma_0(N)$ and Products of Jacobi Theta Functions

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Abstract

We give a closed formula for the sum of all Hecke eigenforms on $\Gamma_0(N)$, multiplied by their odd period polynomials in two variables, as a single product of Jacobi theta series for any squarefree level N. We also show that for N =2, 3 and 5 this formula completely determines the Fourier expansions all Hecke eigenforms of all weights on $\Gamma_0(N)$. This is a Generalizing a result of Zagier in 1991 for modular forms of level one.
This is a joint work with Yoonkyung Park and Don Zagier.