Mathematics > Number Theory

On a completed generating function of locally harmonic Maass forms

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While investigating the Doi-Naganuma lift, Zagier defined integral weight cusp forms f_D which are naturally defined in terms of binary quadratic forms of discriminant D. It was later determined by Kohnen and Zagier that the generating function for the f_D is a half-integral weight cusp form. A natural preimage of f_D under a differential operator at the heart of the theory of harmonic weak Maass forms was determined by the first two authors and Kohnen. In this paper, we consider the modularity properties of the generating function of these preimages. We prove that although the generating function is not itelf modular, it can be naturally completed to obtain a half-integral weight modular object.

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