DIFFERENTIAL ACTIONS ON THE ASYMPTOTIC EXPANSIONS OF NON-HOLOMORPHIC EISENSTEIN SERIES AND APPLICATIONS

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The main object of this talk is the non-holomorohic Eisenstein series $E_k(s;z)$ attached to $SL_2(\mathbb{Z})$ with an arbitrary even integer weight k. It is in fact possible to transfer from $E_0(s;z)$ to $E_k(s;z)$ (for any even k) by repeated use of Maass' weight change operators. In this talk we shall first present a complete asymptotic expansion of $E_k(s;z)$ in the descending order of $\operatorname{Im} z$ as $\operatorname{Im} z \to \pm\infty$; this is established upon the successive application of Maass' operators to the previously obtained asymptotic expansion of the Epstein zeta-function (due to the author [to appear]), which can readily be switched to that of $E_0(s;z)$. Various applications of our main formula will also be presented; these include Kronecker-type limit formulae, representation of *holomorphic* Eisenstein series in terms of Lambert series, and justification of the eigenfunction equation satisfied by $E_k(s;z)$.

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