Oscillatory Integrals for Meromorphic Functions

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We attach to a germ of meromorphic function f, real or complex, an oscillatory integral depending on a parameter. We prove the existence of two different asymptotic expansions for this type of integrals. One, when the norm of the parameter tends to infinity, and other when the norm of the parameter tends to zero. Each of these expansions involve functions of type $A\left(\frac{z}{|z|}\right)|z|^N \ln^v |z|$ where the pairs (N, v) are obtained from an embedded resolution of singularities of a divisor determined by f. We follow a classical approach, which consists in, first, establishing the meromorphic continuation of the local zeta functions attached to f, and then in showing that the asymptotic expansions for the corresponding oscillatory integrals are controlled by the poles of the local zeta functions.

The announced results form part of an ongoing work of the author with Willem Veys.