

A decomposition of meromorphic differentials and its applications

By

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Introduction

The purpose of the present paper is to give some results concerned with the theory of Abelian differentials on open Riemann surfaces with certain null boundaries. So far almost all the theories of Abelian differentials on open Riemann surfaces have dealt with the meromorphic differentials which are square integrable outside of compact subsets. For instance Riemann-Roch's theorem and Abel's theorem are formulated in terms of those meromorphic differentials and their integrals with certain boundary behaviors. (cf. L. Ahlfors [1], Y. Kusunoki [2] [3], M. Shiba [5] and M. Yoshida [7], etc.)

Recently Y. Sainouchi [4] has introduced some metric conditions on open Riemann surfaces and meromorphic differentials, and succeeded in a systematic treatment of meromorphic differentials with an infinite number of polar singularities under these metric conditions. On the other hand M. Shiba has generalized the notion of the divisors on open Riemann surfaces by making use of the notion of behavior spaces introduced by himself in [5] and proved a duality theorem [6]. This generalized notion of divisors makes possible to deal with certain infinite divisors. However Sainouchi's treatment and Shiba's one for infinite divisors are different and it is desirable to unify two approaches.

In the present paper we give a generalization of the notion of divisors on open Riemann surfaces with certain null boundaries and prove a duality theorem (Theorem I) which includes the Sainouchi's