ISSN 1995-0802, Lobachevskii Journal of Mathematics, 2018, Vol. 39, No. 6, pp. 771–776. © Pleiades Publishing, Ltd., 2018.

Meromorphization of M. I. Kinder's Formula Via the Change of Contours

A. V. Kazantsev*

(Submitted by A. M. Elizarov)

Kazan (Volga Region) Federal University, ul. Kremlevskaya 18, Kazan, 420008 Russia

Received August 8, 2017

Abstract—Parametrical families of the exterior inverse boundary value problems going back to well-known R. B. Salimov's book became a plentiful source of new statements and methods in the study of the above problems. Critical points of conformal radii acting as the free parameters of such problems show interesting interrelations between their parametrical dynamics and geometric behavior. M.I. Kinder's formula connecting the numbers of local maxima and saddles of a conformal radius is generalized here on the case when the derivative of the mapping function has zeros and poles in the unit disk and on its boundary.

DOI: 10.1134/S1995080218060094

Keywords and phrases: *Conformal radius, hyperbolic derivative, exterior inverse boundary value problem, Gakhov class, Gakhov equation, M. I. Kinder's formula.*

1. INTRODUCTION

Problems on the change of contours have arisen as the class of the exterior inverse boundary value problems (IBVP) with the boundary conditions depending on the additional parameters. The charm of these problems is connected with the "Sturm und Drang Periode" in the development of the exterior IBVP when the model problems didn't separate yet from the applied ones, and mathematicians and mechanics were united not only by the *Memory*, but mainly by the *memories* of the heroic cooperation.

The monograph [1] in which the additional parameter has been first introduced in the statement of IBVP became one of the tops crowned the above "Periode" in the development of the exterior problems.

As well as in any historical milestone, it is possible to see the mystery elements in the treatise [1]: in spite of the fact that at each stage of the solution of exterior IBVP on change of contours the linearization with respect to the parameter is carried out, the condition of construction of the *approximate* solution of the above IBVP ([1], p. 64) turns out to be the condition of existence and uniqueness of its *exact* solution [2].

Thus, the book [1] stimulated a further study of the parametrical families of exterior problems and their bifurcations (e.g., [2, 3], etc.), including the research undertaken in the present note.

Recall that here we deal with the exterior inverse boundary value problem with respect to the parameter s in F. D. Gakhov's posing [4], and that first of all due to the papers [5–7] the following discourse has been formed to articulate the traditional description of the picture of solvability of such a problem. Namely, for the fixed boundary data the set of the solutions of the exterior IBVP is exhausted by the collection of the integral representations of the form

$$F(\zeta) = \int_b^\zeta f'(t) \left(\frac{1 - \bar{a}t}{t - a} \right)^2 dt. \tag{1}$$

*E-mail: avkazantsev63@gmail.com