

PREFACE

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The Laplace Transform method in combination with the aesthetically beautiful Wiener-Hopf Technique, has not been very widely used to solve Transport Problems, though it has been successfully applied to solve Transport Problems in finite media by some authors: Placzek and Seidel (1947), Marshak (1948), Shu-Su Huang (1955), Das Gupta (1956, 1957, 1958, 1965), Boffi (1970) and Das

However, application of Wiener-Hopf Technique to the solutions of more complex types of transport equations in infinite media (see Das Gupta, 1978a) and of transport equations in finite absorbing and multiplying media or in finite active amplifying media (Das Gupta, 1978b; Das Gupta and Das Gupta, 1991) had to wait till the appearance of the papers on H-functions of photon or particle transport problems in passive, multiplying media by Das Gupta (1974, 1977, 1978).

The purpose of the present work is to apply the Laplace Transform cum Wiener-Hopf Technique (in Das Gupta's modified form) to the exact solutions of transport equations in finite passive and multiplying media. Das Gupta (1978a, 1978b) first applied the method to obtain solution of radiative transfer equation in an infinite medium presenting a complex type of scattering and absorption, and in a finite passive medium scattering radiation with moderate anisotropy, both for the conservative and the non-conservative cases.

The success of the Wiener-Hopf Technique (as applied here to the exact solution of linear singular integral Equations to which the integro-differential transfer equations are transformed by the method of Laplace Transformation, using the appropriately prescribed boundary conditions depends on the suitable decompositions of complex functions and of the product of complex functions (Das Gupta, 1978b; cf. Das Gupta and Das Gupta, 1987), into two parts with two domains of regularity such that the two parts are equal on the non-null intersection of the two domains of regularity and satisfy certain analytic properties at the origin and at infinity. After recasting the equation in a way suitable for the application of Wiener-Hopf. Technique, through rearrangements and shifting of functions (and the decomposed parts) on the two sides of the equation (followed by some analytic arguments) we get the solution literally served on a plate by a modified form of Liouville's theorem (Titchmarsh, Theory of functions, Oxford, 1932, art. 283).

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