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Fokas transform method for classes of advection-diffusion IBVPs¹

A.G. Sifalakis*, M.G. Papadomanolaki, E.P. Papadopoulou and
Y.G. Saridakis

Applied Mathematics and Computers Laboratory (AMCL)

Technical University of Crete

Chania 73100, Greece

*sifalak@gmail.com

Abstract

It is now well established that Fokas transform approach for the solution of linear PDE problems, yields novel integral representations of the solution in the complex plane that, for appropriately chosen integration contours, decay exponentially fast and converge uniformly at the boundaries. Motivated by these method-inherent advantages and the fact that their coupling with simple quadrature integration rules produce practical, powerful and efficient methods, recently we considered applying them for the solution of discontinuous advection-diffusion equations that model the evolution of aggressive forms of primary brain tumors in heterogeneous brain tissue. The purpose of the present work is two-folded:

- To review our recent results on the Fokas method for multi-domain linear advection-diffusion equations with discontinuous diffusivity for brain tumor models
- To examine the behavior of the Fokas method for classes of advection-diffusion equations with linear in t diffusivity in the real half-line, as the first step of extending the above results in non-constant diffusivity models.

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