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Special Section on Open Door Initiative (ODI) – 3rd edition

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PREFACE
3rd *Open Door Initiative* (ODI) collection on *Variational Iteration Method (VIM)* of He to *Heat, Momentum and Mass Transfer Problems*

Dear Readers,

The articles of the 3rd ODI collection devoted to the variational iteration method (VIM) of He is your hands. This collection was especially designed to demonstrate the power of VIM for solution of non-linear problems arising in heat mass and momentum transfer.

The variational iteration method is one of powerful analytical tools emerging in the last two decades for solving non-linear problems;

The collection of seven articles encompasses problems from heat transfer where most of non-linear problem arise [1], [2]. It was rapidly recognized by the scientist as a tool to solve many problems is a straightforward way [3], [4], [5]. The astonishing plethora of articles on VIM grows each year and to some extent it is hard to find articles devoted to real-world problems, since the dominating publications are on specific mathematical issues of method. Without neglecting the specific issues of the initial approximations and the improving of the convergences we have to stress the attention on the fact that solution of real non-linear problems by VIM will attract more authors to this powerful technique.

The heat transfer problem dominates in the present ODI collection. The non-linearity emerging when heat radiation terms are involved either in the equation or in the boundary condition was solved by F. Geng [6] and Hristov [7]. The hat transfer coefficient at the interface of mold systems was solved by Hetmaniok et al [8]. Improvements of the method in solutions of heat transfer problem were developed by Geng [6] and Torvattanabun et al.[9]. A new fractional Bernoulli equation was formulated in [7].

A very interesting application of VIM to mass transfer, especially the transient diffusion in composite membranes for insulin delivery was developed by Angel Joy and Rajedran [10]. Mathematical issues addressing the improvements of VIM to solutions of sub-diffusion problems were developed by Wu [11] and Das [12].

In the context of development of VIM to fractional differential equations we have to stress the attention on the development of the correction functional and especially the determination of the Lagrange multiplier and the consequent integration. The common approach is to replace the Riemann-Liouville integral by integer one (Riemann) thus avoiding the impossibility of the fractional integral to hold the integration by parts. This idea comes from the first articles of He (see Ref. [1], [2]). It was widely applied for many problems, so nobody asks why this should be done, while in the fractional integration the correct fractional integral should be applied. The answer of this question is provided by the article of Wu [10] where by an initial application of the Laplace transform and subsequent integration by part the proper Lagrange multiplier is defined. The new Lagrange multiplier of Wu [10] allows easily applying the Riemann-Liouville integration in the correction functional instead the common integer-order integration. These issues were tested in the article of Hristov [7] where both the Wu's multiplier and the RL integration were applied successfully parallel to the classic approach currently dominating in the literature.

We believe that all problems discussed in this collection of article on VIM's applications may help the scholars to discover the power of the variational iteration method as well some new issues

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in its development to be implemented. It would be nice if the articles would be well accepted by the scientific community and the ideas developed would be sound and provoke new research.

Last but not least, I like to express my gratitude to all authors who trusted me in the initial step of this edition of the ODI initiative, wrote nice articles and collaborated in a perfect way to complete the project. Dear all, it was my please to work with you. Your efforts are highly appreciated.

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