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LETTER AND REPLY TO THE EDITOR

LETTER:

Variational iteration method for Nonlinear Oscillators: A comment on "Application of Laplace Iteration method to Study of Nonlinear Vibration of laminated composite plates"

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1 INTRODUCTION

The variational iteration method was proposed by Ji-Huan He in later 1990s [1,2]. It has been caught much attention since 2007[3,4], when the method was systematically summarized and variational iteration formulae for various nonlinear equations were given. See, for examples, Eqs.(18a)-(25a) and Eqs.(18d)-(25d) in Ref.[4]. The method became accessible to non mathematicians and it is reviewed, with applications, in Refs.[5,6].

2 VARIATIONAL ITERATION METHOD

Consider a nonlinear oscillator

$$\frac{d^2u}{dt^2} + N(u) = 0 \tag{1}$$

Assume its frequency is ω, we re-write Eq.(1) in the form

$$\frac{d^2u}{dt^2} + \omega^2 u + f(u) = 0 \tag{2}$$

where

$$f(u) = N(u) - \omega^2 u \tag{3}$$

According to Eq.(21d) given in Ref.[4], the following variational iteration formulation can be obtained

$$\begin{aligned} u_{n+1}(t) &= u_0(t) + \frac{1}{\omega}\int_0^t \sin\omega(s-t) f(u_n(s))ds \\ &= u_0(t) + \frac{1}{\omega}\int_0^t \sin\omega(s-t)\left[N(u_n(s)) - \omega^2 u_n(s)\right]ds \end{aligned} \tag{4}$$

This is exactly Eq.(26) in Ref.[7]. Eq.(4) is generally called as the variational iteration algorithm-II[6,8].

Ref.[7] used the Laplace transform to re-construct the variational iteration algorithm, an idea first proposed by Hesameddini and Latifizadeh [9]. Wu[10] also pointed out that the Laplace transform is suitable for easy identification of the Lagrange multiplier in the variational iteration method and it is extremely effective for fractional calculus[1,6,8,11,12].

3 CONCLUSION

The method in Ref.[7] is not new at all. It is the variational iteration method itself. Neither Laplace (23 March 1749 – 5 March 1827), nor authors of Ref. [7], are the inventors of the method.

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REPLY:

Dear Editor

Thanks for your enquires about our the paper **"Application of Laplace Iteration method to Study of Nonlinear Vibration of laminated composite plates"** [1]

Variational Iteration Method presented by He [2] is a well known approach in solving different problems especially nonlinear ones. Its wide application along with its effectiveness and excellent accuracy can be seen in available literature. In this method, calculating landa (λ) coefficients is a major step which can result in complicated equations in engineering applications.
As it is mentioned in the comment [3] and also in our paper [1] reconstruction of the VIM is done by Hesameddini et al [4]. Moreover, Laplace Method is a well known and established approach in engineering especially vibration problems. In order to develop a more sensible and acceptable approach for engineers and scholars, we have implemented this method in our work [1] with reference to Hesameddini's paper [4]. The final results of the two approaches are proved to be equal as mentioned by the fourth reference of comment [2, 3].
However, concluding that these two methods are the same just because of the equality of the results is not so far from claiming that Lagrangian and Newtonian dynamics are the same because they tend to result in the same equations.
In our paper we have not claimed that we have developed a new method but just using Hesameddini's reconstruction [4] in computing natural frequency of a plate. More specifically, we have investigated vibrations of a composite plate parametrically and for this purpose we have applied Laplace

method and in order to make distinguish it from the common Variational Iteration Method, VIM, it is addressed Laplace Iteration Method or LIM.
Having all said, although in our view this comment is a non-academic struggle to save a name and not a scientific discussion, we like to add that VIM is accepted and respected for everybody as a basic and general approach.
This should be mentioned that some of the methods which result in the same answers and implement different mathematical approach; they are connected in a mechanical view. Since it is out of our discussion here we do not go deeper in this topic.

The authors in [1]

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