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# Выбор тома

The screenshot shows the website interface for the 'Advanced Engineering Forum'. The top navigation bar includes links for 'DISTRIBUTION & ACCESS', 'FOR PUBLICATION', 'SUPPLEMENTS', 'ABOUT US', and 'CONTACT US', along with a search icon, a shopping cart icon, and a 'LOGIN' button. The main content area is titled 'Advanced Engineering Forum' and features a 'Volumes' tab. A list of volumes is displayed, including 'Advanced Engineering Forum Vol. 32', 'Vol. 31', 'Vol. 30', and 'Vol. 29'. Each volume entry includes the online start date and a brief description. Two blue callout boxes are overlaid on the page: one on the left sidebar pointing to the 'Advanced Engineering Forum' link with the text 'Простая и быстрая навигация по периодике' (Simple and fast navigation in the journal), and another on the right pointing to the volume list with the text 'Удобный просмотр изданий, опубликованных в периодических изданиях' (Convenient viewing of issues published in periodicals).

Простая и быстрая навигация по периодике

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Volume	Online since	Description	Page Count
<b>Advanced Engineering Forum Vol. 32</b>	April 2019	The 32nd volume of the journal "Advanced Engineering Forum" includes peer-reviewed ...more	32
<b>Advanced Engineering Forum Vol. 31</b>	February 2019	The 31st volume of the journal "Advanced Engineering Forum" contains peer-reviewed manuscripts describing the results of engineering solutions and research dealing with ...more	31
<b>Advanced Engineering Forum Vol. 30</b>	November 2018	The 30th volume of the journal "Advanced Engineering Forum" is collected from peer-reviewed manuscripts describing the results of engineering solutions and research dealing ...more	30
<b>Advanced Engineering Forum Vol. 29</b>	August 2018	The 29th volume of the journal "Advanced Engineering Forum" was collected from peer-reviewed manuscripts describing the results of engineering solutions and research dealing ...more	29

# Выбор статьи

The screenshot shows the website interface for 'Advanced Engineering Forum Vol. 32'. The top navigation bar includes 'DISTRIBUTION & ACCESS', 'FOR PUBLICATION', 'SUPPLEMENTS', 'ABOUT US', and 'CONTACT US'. A search bar and a 'LOG IN' button are also present. A blue callout bubble points to the 'Main Themes' sidebar, which lists volumes from 23 to 32. Another blue callout bubble points to the article list, which includes titles like 'An Explicit Solution to Continuum Compliant Cantilever Beam Problem...' and 'Finite Element Analysis to Verify the Structural Integrity of an Aeronautical Gas Turbine Disc...'. A third blue callout bubble points to the search bar.

Список статей, опубликованных в журнале

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**Advanced Engineering Forum Vol. 32**

Papers Book doi: <https://doi.org/10.4028/www.scientific.net/AEF-32>

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# Страница статьи

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**Paper Titles**

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- Finite Element Analysis to Verify the Structural Integrity of an Aeronautical Gas Turbine Disc Made from Inconel 713LC Superalloy p.15
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**An Explicit Solution to Continuum Compliant Cantilever Beam Problem with Various Variational Iteration Algorithms**

114 views, 33 downloads

**Abstract:**

The geometric nonlinearity resulting from large deformation of compliant members has continued to be an interesting research topic in nonlinear mechanics. In this study, two standard variational iteration algorithms, VIM-I and VIM-III are employed to investigate the large deformation of the continuum compliant beam under point load. The VIM is an efficient technique that bypasses the linearization process and proffers solutions to nonlinear problems. The horizontal and vertical displacements of the continuum compliant cantilever beam free end are expressed in explicit analytical forms. Numerical experiment and simulations were carried out to validate the efficacy and applicability of the semi-analytical method. The VIM-I was split into two; VIM-I(A) and VIM-I(B), with the difference being the initial approximations. The results from the VIM-I(A), VIM-I(B) and VIM-III algorithms were compared with the experimental and exact solution. The outcomes reveal that both algorithms correlated well with the analytical solution and experimental result.

**Info:**

Periodical: [Advanced Engineering Forum \(Volume 32\)](#)

Main Theme: [Advanced Engineering Forum Vol. 32](#)

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DOI: <https://doi.org/10.4028/www.scientific.net/AEF.32.1>

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Online since: April 2019

Authors: [✉ Theddeus T. Akano \\*](#)

# Страница предварительного просмотра

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Online: 2019-04-19

**An Explicit Solution to Continuum Compliant Cantilever Beam Problem with Various Variational Iteration Algorithms**  
AKANO Theddeus<sup>1\*</sup>  
<sup>1</sup>Department of Systems Engineering, University of Lagos, Akoka, 101017, Lagos, Nigeria  
\*takano@unilag.edu.ng

**Keywords:** geometric nonlinearity; compliant mechanism; variational iteration algorithms; continuum mechanics; large deformation

**Abstract.** The geometric nonlinearity resulting from large deformation of compliant members has continued to be an interesting research topic in nonlinear mechanics. In this study, two standard variational iteration algorithms, VIM-I and VIM-III are employed to investigate the large deformation of the continuum compliant beam under point load. The VIM is an efficient technique that bypasses the linearization process and proffers solutions to nonlinear problems. The horizontal and vertical displacements of the continuum compliant cantilever beam free end are expressed in explicit analytical forms. Numerical experiment and simulations were carried out to validate the efficacy and applicability of the semi-analytical method. The VIM-I was split into two; VIM-I(A) and VIM-I(B), with the difference being the initial approximations. The results from the VIM-I(A), VIM-I(B) and VIM-III algorithms were compared with the experimental and exact solution. The outcomes reveal that both algorithms correlated well with the analytical solution and experimental result.

**Introduction**

The compliant mechanism (CM) gains some or all its motion from the deformation of slender segments rather than from relative motion the rigid-body links and joints [1]. Despite the comparative advantage of CMs over their rigid body counterparts, their design is complicated by the flexible members. The study of geometric nonlinearities introduced by the large deformation in elastic beams has been a centre of focus for various researchers over time [2]-[4]. In these applications, the curvature is nonlinear, resulting from material and geometry. A nonlinear mathematical model is required to capture the material and geometrical nonlinearities resulting from nonlinear deflection. As such, analytical approaches are difficult to determine the solution of the resulting formulation. Hence numerical and semi-analytical approximate methods should be employed.

A few studies have investigated the nonlinear deformation of beams [2]-[4]. Attempts by direct analytical procedure, mainly through elliptic integrals [5]-[7] are too difficult to handle. Perturbation method [8] has been a notable method in a solution of nonlinear equations. But, the method is based on the existence of a small parameter that makes it difficult to develop the technique for diverse applications. A number of the earlier works were focused on the development of numerical algorithms [9]-[12] to tackle this nonlinear problem. However, the laborious computational involvement of these methods has deterred researchers from using them. Recently, some approximate analytical solutions are proposed, such as, Adomian decomposition method (ADM) [11][13][14], homotopy analysis method (HAM) [4][15][16], homotopy perturbation method (HPM) [15], [17]-[22], Chebyshev's polynomial approximation method [23] and differential transform method (DTM) [24]-[27]. The present study aim at exploring the various algorithms of variational iteration method (VIM) in the solution the nonlinear differential equation resulting from the large deformation of a continuum compliant cantilever beam under point load at the free.

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Forum, Vol. 32, pp. 1-13, 2019



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The image shows a sequence of three browser screenshots illustrating the user experience on the Scientific.Net website. The top screenshot displays the 'Distribution & Access' page, which includes a navigation menu, a search bar, and a 'LOG IN' button. The middle screenshot shows the 'Login' page with fields for 'Username \*' and 'Password \*', a 'Remember me' checkbox, and a 'Forgot your password?' link. A blue callout box with the text 'Вариант подписки' (Subscription option) points to the 'LIBRARY ACCOUNT' section. The bottom screenshot shows the 'Registration' page with sections for 'General Information' and 'Additional Information', each containing several input fields for user details.

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