SDG 17: PARTNERSHIPS FOR THE GOALS

# Indicator 17.2.4 — International Collaboration for SDG Best Practice

Reviewing comparative approaches and developing international best practice on tackling the SDGs through international collaboration and research




| 3 | 2 | 2 | 1 |
|---|---|---|---|
| internationally connected research outputs, 2025 | co-authored with universities abroad | partner countries (Ethiopia, South Africa) | international conference (Uzbekistan) |

**Centurion University of Technology and Management, Andhra Pradesh (CUTM AP)**

Tekkali Village, Nellimarla Mandal, Vizianagaram – 535003, Andhra Pradesh, India

Evidence report for Times Higher Education Impact Rankings · Reporting period: January – December 2025

## 17.2.4 The Indicator and Our Response

What Times Higher Education asks, and what CUTM AP reports for 2025

Indicator 17.2.4 asks whether, through international collaboration and research, the university reviews comparative approaches and develops international best practice on tackling the Sustainable Development Goals.

In 2025 researchers of Centurion University of Technology and Management, Andhra Pradesh (CUTM AP) published research with universities in Ethiopia and South Africa that compares approaches — ferrite compositions for energy-efficient components, and iterative numerical methods of the same order — and presented, at an international conference in Uzbekistan, a comparative review of how artificial intelligence improves the efficiency and sustainability of renewable energy systems (SDG 7).

| No. | Research output (2025) | International partner | SDG relevance | Proof |
|---|---|---|---|---|
| 1 | **Assessment of micro-structural and magnetic properties of M0.5Cu0.4Zn0.1Fe2O4 (M = Ni, Co) nanocrystalline ferrites** | Prof. Paulos Taddesse — Department of Physics, College of Natural Science, Arba Minch University, Ethiopia | SDG 7 (energy efficiency) · SDG 9 (innovation in materials) | **Section 1, Annex 1** |
| 2 | **The Dynamics and Applications of an Optimal Iterative Method** | Dr Virath Singh — Senior Lecturer of Mathematics, University of KwaZulu-Natal, Durban, South Africa | SDG 9 (scientific research capability) · SDG 3 (applications in medical science) | **Section 2, Annex 2** |
| 3 | **Artificial Intelligence in Renewable Energy Systems: Optimizing Efficiency, Sustainability, and Business Management** | Presented at an international conference in Tashkent, Uzbekistan | SDG 7 (affordable and clean energy) · SDG 9 · SDG 12 · SDG 13 | **Section 3, Annex 3** |

| 3 | 2 | 6 | 2 |
|---|---|---|---|
| research outputs, 2025 | universities abroad | CUTM AP researchers involved | partner countries abroad |

# 1 International Co-authored Research

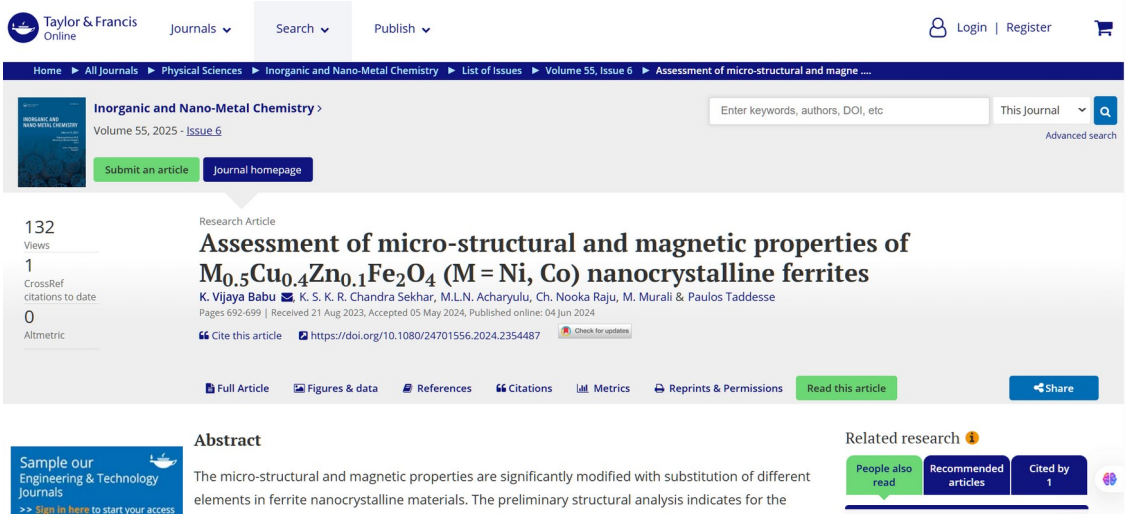
Inorganic and Nano-Metal Chemistry (Taylor & Francis), Vol. 55, Issue 6, 2025, pp. 692–699

## Assessment of micro-structural and magnetic properties of M0.5Cu0.4Zn0.1Fe2O4 (M = Ni, Co) nanocrystalline ferrites

| | |
|---|---|
| **Published in** | Inorganic and Nano-Metal Chemistry (Taylor & Francis), Vol. 55, Issue 6, 2025, pp. 692–699 |
| **Dates** | Received 21 Aug 2023 · Accepted 5 May 2024 · Published online 4 Jun 2024 · Issue 6, 2025 |
| **DOI** | https://doi.org/10.1080/24701556.2024.2354487 |
| **Authors** | K. Vijaya Babu, K. S. K. R. Chandra Sekhar, M. L. N. Acharyulu, Ch. Nooka Raju, M. Murali, Paulos Taddesse |
| **CUTM AP authors** | Dr K. Vijaya Babu (Physics, corresponding author), Dr M. L. N. Acharyulu (Chemistry), Ch. Nooka Raju (Radiology), M. Murali (ECE) |
| **International partner** | Prof. Paulos Taddesse — Department of Physics, College of Natural Science, Arba Minch University, Ethiopia |
| **SDG relevance** | SDG 7 (energy efficiency) · SDG 9 (innovation in materials) |

## Comparative approach and contribution to good practice

The team synthesised nickel- and cobalt-based copper-zinc nanocrystalline ferrites and jointly measured and compared their crystal structure (X-ray diffraction: single-phase cubic spinel, space group Fd-3m) and magnetic properties. Soft ferrites of this kind are used in energy-efficient inductors, transformers and electronic components.




*Article page on Taylor & Francis Online showing the title, the six authors, volume 55 (2025) and the DOI. (Annex 1).*

# 2 International Co-authored Research

IAENG International Journal of Applied Mathematics, Vol. 55, Issue 6, June 2025, pp. 1519–1530

## The Dynamics and Applications of an Optimal Iterative Method

| | |
|---|---|
| **Published in** | IAENG International Journal of Applied Mathematics, Vol. 55, Issue 6, June 2025, pp. 1519–1530 |
| **Dates** | Received 23 Jul 2024 · Revised 4 Apr 2025 · Issue June 2025 |
| **Authors** | Mani Sandeep Kumar Mylapalli, Navya Kakarlapudi, Virath Singh, Chaganti Pragathi, Perumali Sundarayya |
| **CUTM AP authors** | Navya Kakarlapudi, Assistant Professor of Mathematics, Centurion University of Technology and Management, Vizianagaram |
| **International partner** | Dr Virath Singh — Senior Lecturer of Mathematics, University of KwaZulu-Natal, Durban, South Africa |
| **SDG relevance** | SDG 9 (scientific research capability) · SDG 3 (applications in medical science) |

## Comparative approach and contribution to good practice

The team developed a sixteenth-order optimal iterative method for solving nonlinear equations (efficiency index 1.741), compared it with recent methods of the same order on a set of test functions and real-world problems, and applied it to problems in medical science, physics and chemical engineering.



IAENG International Journal of Applied Mathematics

The Dynamics and Applications of an Optimal Iterative Method

Mani Sandeep Kumar Mylapalli, *Member, IAENG*, Navya Kakarlapudi, Virath Singh, Chaganti Pragathi, Perumali Sundarayya

Volume 55, Issue 6, June 2025, Pages 1519-1530

*First page of the published paper showing the authors' affiliations — Centurion University (CUTM AP) and the University of KwaZulu-Natal, South Africa. (Annex 2).*

# 3 International Conference Paper

2025 International Conference on Technology Enabled Economic Changes (InTech 2025), Tashkent, Uzbekistan, 27–28 Feb 2025 — IEEE Xplore

## Artificial Intelligence in Renewable Energy Systems: Optimizing Efficiency, Sustainability, and Business Management

| | |
|---|---|
| **Published in** | 2025 International Conference on Technology Enabled Economic Changes (InTech 2025), Tashkent, Uzbekistan, 27–28 Feb 2025 — IEEE Xplore |
| **Dates** | Presented 27–28 Feb 2025 · Published in IEEE Xplore |
| **Authors** | Sudheer Choudari, R. Ramakrishna, P. Malathi, J. Venkatagiri, Saket Rusia, Syed Azazul Haque |
| **CUTM AP authors** | Sudheer Choudari, Centurion University of Technology and Management |
| **International partner** | Presented at an international conference in Tashkent, Uzbekistan |
| **SDG relevance** | SDG 7 (affordable and clean energy) · SDG 9 · SDG 12 · SDG 13 |

## Comparative approach and contribution to good practice

The paper reviews studies published between 2007 and 2025 on the use of artificial intelligence in renewable energy systems, comparing approaches such as predictive maintenance, demand forecasting and deep-learning models, and sets out how they improve reliability, energy-conversion efficiency and sustainable business management.




*Paper page on IEEE Xplore showing the title, authors and the 2025 international conference. (Annex 3).*

# ✔ Summary of Evidence

Indicator 17.2.4 — Centurion University of Technology and Management, Andhra Pradesh, 2025

| Research output | International collaboration |
|---|---|
| **1. Assessment of micro-structural and magnetic properties of M0.5Cu0.4Z...** | Prof. Paulos Taddesse — Department of Physics, College of Natural Science, Arba Minch University, Ethiopia. Inorganic and Nano-Metal Chemistry (Taylor & Francis), Vol. 55, Issue 6, 2025, pp. 692–699. |
| **2. The Dynamics and Applications of an Optimal Iterative Method** | Dr Virath Singh — Senior Lecturer of Mathematics, University of KwaZulu-Natal, Durban, South Africa. IAENG International Journal of Applied Mathematics, Vol. 55, Issue 6, June 2025, pp. 1519–1530. |
| **3. Artificial Intelligence in Renewable Energy Systems: Optimizing Effi...** | Presented at an international conference in Tashkent, Uzbekistan. 2025 International Conference on Technology Enabled Economic Changes (InTech 2025), Tashkent, Uzbekistan, 27–28 Feb 2025 — IEEE Xplore. |

**HOW THIS MEETS INDICATOR 17.2.4**

Through research with universities in Ethiopia and South Africa and a comparative review presented at an international conference, CUTM AP researchers compared approaches and contributed to good practice on clean energy and innovation (SDG 7, SDG 9).

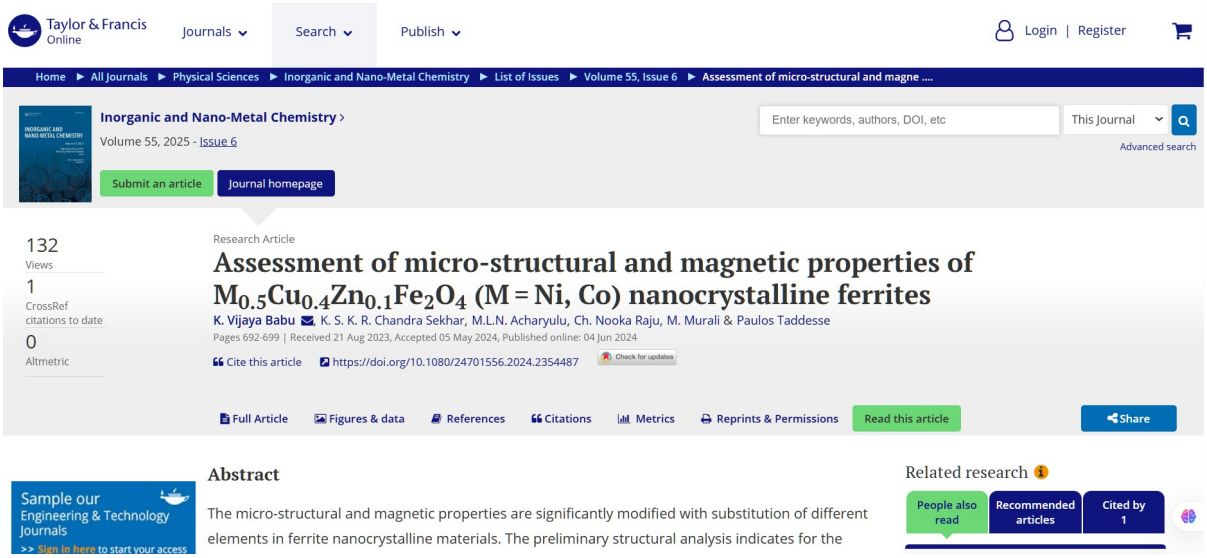
# ANNEXURES

Proof of publication and authorship

## Annex 1

## Assessment of micro-structural and magnetic properties of M0.5Cu0.4Zn0.1Fe2O4 (M = Ni, Co) nanocrystalline ferrites

Inorganic and Nano-Metal Chemistry (Taylor & Francis), Vol. 55, Issue 6, 2025, pp. 692–699



**Annex 2**

## The Dynamics and Applications of an Optimal Iterative Method

IAENG International Journal of Applied Mathematics, Vol. 55, Issue 6, June 2025, pp. 1519–1530

**IAENG International Journal of Applied Mathematics**

# The Dynamics and Applications of an Optimal Iterative Method

Mani Sandeep Kumar Mylapalli, *Member, IAENG*, Navya Kakarlapudi, Virath Singh, Chaganti Pragathi, Perumali Sundarayya

***Abstract*— In this paper, we develop a sixteenth-order iterative scheme to compute the zero of the nonlinear equation in four steps, using five functional evaluations, and achieve optimality with an efficiency index of 1.741. We also discuss the theoretical convergence analysis of the approach and compare the proposed technique with recent methods of equal order regarding successive errors, number of iterations, and functional evaluations by taking several algebraical, and transcendental test functions. The developed method is put into practice in applications in the fields of medical sciences, physics, and chemical engineering. Various approaches are analyzed using basins of attraction to show taking polynomials as test functions in a complex plane.**

***Index Terms*— Nonlinear Equation, Optimal order, Efficiency Index, Order of Convergence, Iterative Method, Functional Evaluations, Basins of Attraction.**

## I. Introduction

SOLVING nonlinear equations are among the most critical challenges in scientific and technical applications. Nonlinear equations can be used to solve several optimization challenges in various applications. Computing their roots in a finite number of arithmetic operations is generally tricky. A subfield of computer science and mathematics known as numerical analysis creates evaluates and applies algorithms to resolve numerical issues. This work is about iterative approaches for finding a simple root $x$, i.e., $h(x)=0$. The most well-known and frequently applied methodology for resolving nonlinear equations is Newton Rahson's method (NR) [2] and its efficiency index is $\sqrt{2}=1.414$. It is given by,

$$x_{n+1}=x_n-\frac{h(x_n)}{h'(x_n)},\quad n=0,1,2,\ldots \tag{1}$$

This employs a one-step iterative procedure. Newton's method has a quadratic order of convergence to get a simple zero.

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This work aims to build an effective derivative-free technique for solving nonlinear equations. We developed a new optimal iterative approach to bolster the hypothesis. Based on $N$ functional assessments, Kung-Traub hypothesized that multipoint iteration techniques may attain an optimal convergence order $2N-1$.

This study uses the weight function methodology to build a sixteenth-order iterative method. To improve the iterative method presented, we consider the finite difference approximation and use the approximants of the higher derivatives to avoid computing the high-order derivatives of the function. To evaluate the performance of the new strategy against the current equal-order methods considering a few test functions and real-world application problems. We also studied the dynamic performance of our developed method. The basins of attraction are also shown and contrasted with the other methods of the same order at the study's conclusion.

Some of the existing methods developed recently for solving nonlinear equations are given below:

In the year 2020, an optimal sixteenth-order iterative method (DM) is presented by Dejan Cebic [1] with five functional evaluations and is given as

$$\begin{aligned}
y_n &= x_n-\frac{h(x_n)}{h'(x_n)}\\
z_n &= y_n-\left(3-\frac{2h[y_n,x_n]}{h'(x_n)}\right)\frac{h(y_n)}{h'(x_n)}\\
w_n &= z_n-\frac{h(z_n)}{h'(x_n)}\frac{h'(x_n)-h[y_n,x_n]+h[z_n,y_n]}{2h[z_n,y_n]-h[z_n,x_n]}\\
x_{n+1} &= w_n-\frac{h(w_n)\left(2h[z_n,x_n]-2h[w_n,x_n]+h[w_n,z_n]\right)}{h'(x_n)\left(h[w_n,y_n]-h[z_n,y_n]\right)+h^2[z_n,x_n]-h^2[w_n,x_n]+h^2[w_n,z_n]}
\end{aligned} \tag{2}$$

In the year 2017, A new sixteenth-order optimal iterative method (RM) developed by Rafiullah et al. [4] with six functional evaluations is as follows:

$$\begin{aligned}
y_n &= x_n-\frac{h(x_n)}{h'(x_n)}\\
z_n &= y_n-\frac{h(y_n)}{h'(y_n)}-\frac{\left(h(y_n)\right)^2\left(h'(x_n)-h'(y_n)\right)}{2\left(h(x_n)-h(y_n)\right)\left(h'(x_n)\right)^2}\\
w_n &= z_n-\frac{h(z_n)\left((x_n-y_n)(x_n-z_n)(y_n-z_n)\right)}{\left(-h(z_n)(x_n-y_n)(x_n-2z_n+y_n)+h(y_n)(x_n-z_n)^2-h(x_n)(y_n-z_n)^2\right)}\\
x_{n+1} &= w_n-\frac{h(w_n)}{h'(w_n)}
\end{aligned} \tag{3}$$

**Volume 55, Issue 6, June 2025, Pages 1519-1530**

## Annex 3

## Artificial Intelligence in Renewable Energy Systems: Optimizing Efficiency, Sustainability, and Business Management

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