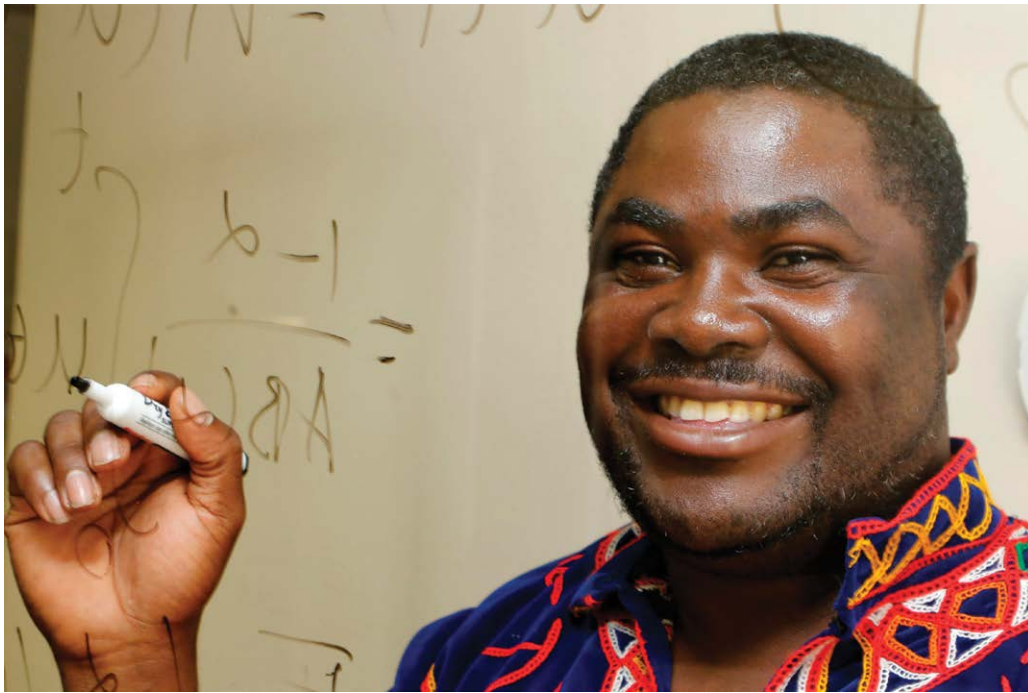


# MATHS PROF MAKES HIS MARK



UFS

Prof. Abdon Atangana, a professor of applied mathematics at the University of the Free State (UFS), was given the first TWAS-Mohammad A. Hamdan Award by The World Academy of Sciences (TWAS) in December 2020. The new award is named after the esteemed mathematician who served as TWAS Vice President for the Arab Region until his death in February 2020. The award comes with a 'purse' of US\$5 000, and will be given every two years for outstanding work in pure mathematics, applied mathematics, probability or statistics by a scientist working and living in the Africa or Arab regions.

Prof. Atangana is recognised for his contributions in the mathematical field of fractional derivatives. In an essay published by Clarivate on the Web of Science Blog in January 2018, he explains these for non-specialist readers.

"To a layman, most physical problems can be expressed in terms of mathematical formulations called differential equations; the differential equation's aim is to analyse, understand, and predict the future of a physical problem. One of the most used differential operators was that developed in the 17<sup>th</sup> century by Isaac Newton and Gottfried Leibniz, but this failed to model complex real-world problems. The concept of non-local operators called fractional derivatives and integrals was suggested by Bernhard Riemann and Joseph Liouville with the aim to capture more complex phenomena, but also failed to model many important real-world problems."

In 2016, Prof. Atangana proposed the Atangana-Baleanu fractional derivative to more accurately model complex

real-world problems. His paper was subsequently named a New Hot Paper for Mathematics in the Clarivate Essential Science Indicators database, and in 2019 he was named a Clarivate Highly Cited Researcher – ranking in the top 1% of citations in the Web of Science – in the field of Mathematics. In 2020 he was included on the list again, but in the Cross-Field category recognising researchers who publish multiple highly cited papers in several different fields.

Prof. Atangana was awarded his PhD by the UFS Institute of Groundwater Studies for his thesis on the use of fractional

derivatives to estimate uncertainties in modelling flow within a pollution-contaminated aquifer in the coastal city of Douala, Cameroon – his home country. He has since been employed at the Institute, but he uses his mathematical skills to solve problems in other fields of science, technology and engineering too. These include, for example, predicting the spread of various diseases, modelling flow in internal combustion engines, and detecting edges in advanced image processing.

Apart from being a prolific contributor of scientific papers, Prof. Atangana has written two books published by Elsevier, and has served on the editorial boards of more than 20 journals.

- Read Prof. Atangana's essay on the Web of Science Blog at <https://clarivate.com/webofsciencelgroup/article/fractional-derivative-modeling-real-world-problems/>

The World Academy of Sciences (TWAS) is based in Trieste, Italy, but was founded in 1983 by a distinguished group of scientists from the developing world, under the leadership of Abdus Salam, the Pakistani physicist and Nobel laureate. It was originally known as the Third World Academy of Sciences, as its goal is to advance science in developing countries. Today, TWAS is a programme unit within UNESCO – the United Nations Educational, Scientific and Cultural Organisation – and has more than 1 200 elected Fellows, 14 of whom are Nobel laureates.

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2021

# Quest Volume 17 Number 1 2021

**Academy of Science of South Africa (ASSAf)**

Academy of Science of South Africa (ASSAf)

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Cite: Academy of Science of South Africa (ASSAf), (2021). Quest: Science for South Africa, 17(1). [Online] Available at: <http://hdl.handle.net/20.500.11911/180>

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