

**Research Articles 2018:**

**Ahokpossi D.P, Atangana A & Vermeulen P.D.** 2018. Hydro-geochemical characterizations of a platinum group element groundwater system in Africa. *Journal of African Earth Sciences.*,138 : pp. 348 - 366.

**Ahokpossi, D.P., & Atangana, A & Vermeulen, P.D.** 2018. Modelling of fractal flow in dual media with fractional differentiation with power and generalized Mittag-Leffler laws kernels. *European Physical Journal: Special Topics*, 226: pp. 3705 - 3727.

**Ali, M.N., Husnine, S.M., Ak, T. & Atangana, A.** 2018. Solitary wave solution and conservation laws of higher dimensional Zakharov-Kuznetsov equation with nonlinear self-adjointness. *Mathematical Methods in the Applied Sciences*, 41: pp. 6611 – 6624.

**Allwright, A. & Atangana, A.** 2018. Fractal advection-dispersion equation for groundwater transport in fractured aquifers with self-similarities. *The European Physical Journal Plus* 133(2): 48.

**Allwright, A. & Atangana, A.** 2018. Augmented upwind numerical schemes for the groundwater transport advection-dispersion equation with local operators. *International Journal for Numerical Methods in Fluids* 87: pp. 437-462.

**Atangana, A.** 2018. Non validity of index law in fractional calculus: A fractional differential operator with Markovian and non-Markovian properties. *Physica A-Statistical Mechanics and Its Applications*, 505 pp. 688 - 706.

**Atangana, A.** 2018. Blind in a commutative world: Simple illustrations with functions and chaotic attractors. *Chaos Solitons & Fractals*, 114 pp. 347 – 363.

**Atangana, A., & Owolabi K.M.** 2018. New numerical approach for fractional differential equations. *Mathematical Modelling of Natural Phenomena*, 13 (3), pp. 1 - 21.

**Atangana, A., & Gomez-Aguilar J.** 2018. Fractional derivatives with no-index law property: Application to chaos and statistics. *Chaos Solitons & Fractals*, 14 pp. 516 - 535.

**Atangana, A., & Jain, S.** 2018. The role of power decay, exponential decay and Mittag-Leffler function's waiting time distribution: Application of cancer spread. *Physica A*, 512: pp 330 – 351.

**Atangana, A., & Jain, S.** 2018. A new numerical approximation of the fractal ordinary differential equation. *The European Physical Journal Plus*, 133:37. DOI 10.1140/epjp/i2018-11895-1

**Atangana, A., & Gómez-Aguilar, J.F.** 2018. Numerical approximation of Riemann-Liouville definition of fractional derivative: From Riemann-Liouville to Atangana-Baleanu. *Numerical Methods Partial Differential Equations*, 34: pp 1502 – 1523.

**Atangana, A., & Gómez-Aguilar, J.F.** 2018. Decolonisation of fractional calculus rules: Breaking commutativity and associativity to capture more natural phenomena. *The European Physical Journal Plus*, 133: 166. DOI 10.1140/epjp/i2018-12021-3

**Atangana, A., & Alqahtani, R.** 2018. New numerical method and application to Keller-Segel model with fractional order derivative. *Chaos Solitons & Fractals*, 116: pp. 14 - 21.

**Atangana, A., & Alkahtani, B.** 2018. New Model for Process of Phase Separation in Iron Alloys. *Iranian Journal of Science and Technology Transaction A-Science*, 42: pp. 1351 - 1356.

**Atangana, A., & Alqahtani, R.T.** 2018. Tumour model with intrusive morphology, progressive phenotypical heterogeneity and memory. *The European Physical Journal Plus*, 133 : 85. DOI 10.1140/epjp/i2018-11932-1

**Atangana, A., & Goufo, E.F.D.** 2018. Conservatory of Kaup-Kupersmidt Equation to the Concept of Fractional Derivative with and without Singular Kernel. *Acta Mathematicae Applicatae Sinica, English Series*. 34 (2), 351 – 361.

**Chiweshe, T.T., Potgieter-Vermaak, S & Pursell, W.** 2018. Characterization of Chromium (III) Compounds Isolated from Different mineral ores using Ammonium Phosphate as Flux. *Mining, Metallurgy & Exploration*. <https://doi.org/10.1007/s42461-018-0010-1>

**Gomez-Aguilar, J.F., Atangana, A., & Escobar-Jiménez, R.F.** 2018. Numerical solutions of Fourier's law involving fractional derivatives with bi-order. *Scientia Iranica*. 25(4), 2175 – 2185.

**Gomo, M., Kotzé, Y & Vermeulen, D.** 2018. Large diameter hand-dug wells in South Africa. *Water Policy* w p2018278.

**Gomo, M.** 2018. Conceptual hydrogeochemical characteristics of a calcite and dolomite acid mine drainage neutralised circumneutral groundwater system. *Water Science* 32: pp. 355 – 361.

**Gomo, M.** 2018. On the interpretation of multi-well aquifer pumping tests in confined porous aquifers using the Cooper and Jacob (1946) method. *Sustainable Water Resources Management*.

**Gnitchogna, R., & Atangana, A.** 2018. New two step Laplace Adam-Bashforth method for integer a noninteger order partial differential equations. *Numerical Methods Partial Differential Equations*, 34: pp 1739 – 1758.

**Guang-an, Z., Atangana, A., & Zhou, Y.** 2018. Error estimates of a semidiscrete finite element method for fractional stochastic diffusion-wave equations. *Numerical Methods Partial Differential Equations*, 34: pp 1834 – 1848.

**Khaled, M. Saad, Baleanu, D., & Atangana, A.** 2018. New fractional derivatives applied to the Korteweg–de Vries and Korteweg–de Vries–Burger's equations. *Computational and Applied Mathematics*, 37: pp 5203 – 5216.

**Khaled, M. Saad, Baleanu, D., & Atangana, A.** 2018. New fractional derivatives with non-singular kernel applied to the Burgers equation. *Chaos*, 28. doi: 10.1063/1.5026284

**Kovaleva, E., Huber, M.S., Fourie, F.D. & Pittarello, L.** 2018. Comparative study of pseudotachylite microstructures in felsic and mafic rocks from the Vredefort impact structure, South Africa. Implications for the experimental studies. *South African Journal of Geology*, DOI: <https://doi.org/10.25131/sajg.121.0025>.

**Kumar D., Singh J., Hammouch, Z., & Atangana A.** 2018. A fractional epidemiological model for computer viruses pertaining to a new fractional derivative. *Applied Mathematics and Computation*. 316: pp. 504 - 515.

**Mathobo, M. & Atangana. A.** 2018. Analysis of exact groundwater model within a confined aquifer: New proposed model beyond the Theis equation. *European Physical Journal Plus*, 133: 415. DOI 10.1140/epjp/i2018-12205-9

**Mokhahlane, L.S., Gomo, M. & Vermeulen, D.** 2018. Acid-base accounting of unburned coal from underground coal gasification at Majuba pilot plant. *The Journal of the Southern African Institute of Mining and Metallurgy*, 118: pp. 1041-1046.

**Mokhahlane, L.S., Gomo, M. & Vermeulen, D.** 2018. Temperature and electrical conductivity stratification in the underground coal gasification zone and surrounding aquifers at the Majuba pilot plant. *The Journal of the Southern African Institute of Mining and Metallurgy*, 118:1053-1058.

**Mokhahlane, L.S., Mathoho, G., Gomo, M., & Vermeulen, D.** 2018. Qualitative hydrogeological assessment of vertical connectivity in aquifers surrounding an underground coal gasification site. *The Journal of the Southern African Institute of Mining and Metallurgy*, 118: pp. 1047 - 1052.

**Oke, S.A., Vermeulen, D. & Gomo, M.** 2018. Intrinsic vulnerability assessment of shallow aquifers of the sedimentary basin of southwestern Nigeria', *Jàmbá: Journal of Disaster Risk Studies* 10(1), a333.

**Owolabi, K.M., & Atangana, A.** 2018. Modelling and formation of spatiotemporal patterns of fractional predation system in subdiffusion and superdiffusion scenarios. *European Physical Journal Plus*, 133 (2), February 2018: pp. 43-1 – 43-13.

**Owolabi, K.M., & Atangana, A.** 2018. Chaotic behaviour in system of noninteger-order ordinary differential equations. *Chaos Solitons & Fractals*, pp. 362 - 370.

**Owolabi, K.M., & Atangana, A.** 2018. Robustness of fractional difference schemes via the Caputo subdiffusion-reaction equations. *Chaos Solitons & Fractals*, 111, pp. 119 - 127.

**Owolabi, K.M., Davison, M., & Pindza E.** 2018. Dynamical study of two predators and one prey system with fractional Fourier transform method. *Numerical Methods for Partial Differential Equations*, 34: pp. 1614 - 1636.

**Owolabi, K.M.** 2018. Numerical patterns in reaction–diffusion system with the Caputo and Atangana–Baleanu fractional derivatives. *Chaos Solitons & Fractals*, 115: pp. 160 - 169.

**Owolabi, K.M.** 2018. Analysis and numerical simulation of multicomponent system with Atangana–Baleanu fractional derivative. *Chaos Solitons & Fractals*, 115: pp. 127 - 134.

**Owolabi, K.M.** 2018. Numerical patterns in system of integer and non-integer order derivatives. *Chaos Solitons & Fractals*, 115: pp. 143 - 153.

**Owolabi, K.M.** 2018. Riemann-Liouville Fractional Derivative and Application to Model Chaotic Differential Equations. *Progress in Fractional Differentiation and Applications*, 4 (2), pp. 99 - 110.

**Owolabi, K.M.** 2018. Modelling and simulation of a dynamical system with the Atangana-Baleanu fractional derivative. *European Physical Journal Plus*, 133 (1), January 2018: pp. 15-1 – 15-13.

**Owolabi, K.M.** 2018. Efficient numerical simulation of non-integer–order space-fractional reaction-diffusion equation via the Riemann-Liouville operator. *European Physical Journal Plus*, 133 (3), March 2018: pp. 98-1 – 98-16.

**Owolabi, K.M.** 2018. Numerical approach to fractional blow-up equations with Atangana-Baleanu derivative in Riemann-Liouville sense. *Mathematical Modelling of Natural Phenomena*, 13 (7), pp. 1 - 17.

**Owolabi, K.M.** 2018. Mathematical analysis and numerical simulation of chaotic noninteger order differential systems with Riemann-Liouville derivative. *Numerical Methods Partial Differential Equations*, 34: pp 274 – 295.

**Moleme, M.F. & Gomo, M.** 2018. Evolution of Fluid Electrical Conductivity Profiles Associated with a Saline Contaminant Plume in a Horizontal Single-Plane Fractured-Rock Aquifer System. *Natural Resources Research*.

**Ramotsho, M.A., & Atangana, A.** 2018. Derivation of a groundwater flow model within leaky and self-similar aquifers: Beyond Hantush model. *Chaos Solitons & Fractals*, 116: pp. 414 - 423.

**Sakala, E., Fourie F., Gomo, M., Coetzee, H.** 2018. GIS-based groundwater vulnerability modelling: A case study of the Witbank, Ermelo and Highveld Coalfields in South Africa. *Journal of African Earth Sciences*, 137: pp. 46 - 60.

**Shakhane, T., & Fourie, F.D.** 2018. An investigation into structural discretisation as a first-order and pilot framework to understand groundwater–stream water connectivity at a reach scale. *Sustainable Water Resources Management*, DOI: <https://doi.org/10.1007/s40899-018-0267-z>.

**Singh, J., Kumar, D., Hammouch, Z., & Atangana, A.** 2018. A fractional epidemiological model for computer viruses pertaining to a new fractional derivative. *Applied Mathematics and Computation*. 316: pp. 504 – 515.

**Solís-Pérez, J.E., Gómez-Aguilar, J.F, & Atangana, A.** 2018. Novel numerical method for solving variable-order fractional differential equations with power, exponential and Mittag-Leffler laws. *Chaos, Solitons and Fractals*, 114: pp 175 – 185.

**Yépez-Martínez, H., Gómez-Aguilar, J.F. & Atangana, A.** 2018. First integral method for non-linear differential equations with conformable derivative. *Mathematical Modelling of Natural Phenomena*. 13:14. <https://doi.org/10.1051/mmnp/2018012>

**Wang, S., Du, S., Atangana, A., Liu, A., Lu. Z.** 2018. Application of stationary wavelet entropy in pathological brain detection. *Multimed Tools Applications*, 77: 3701 - 3714

### Conferences:

Several staff members and students attended international conferences.

**Gomo, M.** 2018. *Geochemical Controls of Salinity in a Typical Acid Mine Drainage Neutralized Groundwater System*. Paper presented at the 20<sup>th</sup> International Conference on Environmental Geochemistry and Geochemical Mapping (ICEGGM), Dubai UAE, 20 – 21 June 2018.

**Huber, M.S., Kovaleva, E. & Fourie, F.** 2018. *Lowermost Termination of Vredefort Granophyre Dyke Results in Unusual Features*. Paper delivered at the 81<sup>st</sup> Annual Meeting of The Meteoritical Society, Moscow, Russia.

**Sakala, E., Fourie, F., Dube, M., Saeze, H. & Cole, P.** 2018. *Development of a software platform for regional groundwater potential mapping using artificial intelligence*. Poster presented at the 6<sup>th</sup> ChinAfrica Water Forum Conference, Sharm El Sheik, Egypt.

**Zielke, J.S.D.R., & Vermeulen, P.D.** 2018. *An integrated approach to evaluate the hydrogeological setting around a water-filled quarry in a mining environment*. Paper delivered at the 11th ICARD and IMWA Conference, Pretoria, 10 – 14 September 2018.

### Book

**Atangana, A.** 2018. *Fractional Operators with Constant and Variable Order with Application to Geo-Hydrology*. Edition: 1st Edition, United Kingdom, London, Academic Press, Elsevier. 414 pp. 9780128096703.

### Reports

**Allwright, A.** 2018. *Union Colliery Geohydrology Investigation: Modelling Report*. Report submitted to South32 Limited.

**Allwright, A.** 2018. *The Influence of Different SASOL Operations on the Graben Structure at SASOL, Secunda: Phase 3 Modelling*. Report submitted to Secunda Synfuels Operations a division of Sasol South Africa (Pty) Ltd.

**Allwright, A.** 2018. *Mooikraal Groundwater Model*. Report submitted to Sasol Mining.