

# Professor Nicholas (Nick) Hale

# Curriculum Vitae (January 2019)

CONTACT INFORMATION	Room A410, Applied Mathematics, Private Bag X1, Stellenbosch University, Matieland 7602, South Africa.	+27 (0)21 808 4944 <a href="mailto:nickhale@sun.ac.za">nickhale@sun.ac.za</a> <a href="http://appliedmaths.sun.ac.za/~nhale/">http://appliedmaths.sun.ac.za/~nhale/</a>
RESEARCH AREAS	Numerical analysis and scientific computing; in particular development of Chebfun (an open-source software project that bridges the gap between numerical and symbolic computing), spectral methods for differential equations, fast algorithms for polynomial and related transforms, numerical solution of fractional differential equations, and numerical complex analysis.	
ORCID ID	<a href="http://orcid.org/0000-0002-2023-0044">http://orcid.org/0000-0002-2023-0044</a>	SA NRF RATING Y1 (2017)
EDUCATION	<b>University of Oxford</b> , Oxford, UK <i>DPhil in Numerical Analysis</i> <ul style="list-style-type: none"><li>· Thesis title: <i>On the use of Conformal Maps to Speed Up Numerical Computations</i></li><li>· Supervisor: Prof. L. N. Trefethen FRS</li></ul> <b>Imperial College London</b> , London, UK <i>MSci Mathematics (Hons) - 1st Class</i> <ul style="list-style-type: none"><li>· Thesis title: <i>A Sixth-Order Extension to the MATLAB bvp4c Software of J. Kierzenka and L. Shampine</i></li><li>· Supervisor: Dr D. R. Moore</li></ul>	<b>October 2006 – October 2009</b> <b>October 2002 – June 2006</b>
PROFESSIONAL EXPERIENCE	<b>University of Stellenbosch</b> , Stellenbosch, South Africa <i>Associate Professor</i> <i>Senior Lecturer</i> <i>Post-doctoral Research Fellowship</i> <ul style="list-style-type: none"><li>· NM262 Numerical methods (Engineering <math>\pm 450</math> students)</li><li>· TW244 Applied differential equations (Science <math>\pm 150</math> students)</li><li>· TW324 Numerical methods (Science <math>\pm 50</math> students))</li><li>· TW776 Numerical linear algebra (Science/Engineering <math>\pm 50</math> graduate students)</li></ul> <b>Oxford Center for Collaborative Applied Mathematics</b> , Oxford, UK <i>Director of the Chebfun Project</i> <ul style="list-style-type: none"><li>· Funded by The MathWorks, Inc. (Producers of MATLAB)</li></ul> <i>Postdoctoral Research Assistant</i> <ul style="list-style-type: none"><li>· Research project: <i>Adaptive Spectral Methods in 1D and 2D</i></li></ul> <b>University of Oxford Numerical Analysis Group</b> , Oxford, UK <i>Lecturer</i> <i>Teaching Assistant</i> <ul style="list-style-type: none"><li>· Practical Numerical Analysis. (Lecturer)</li><li>· Introduction to MATLAB for new DPhil/MSc students. (Lecturer)</li><li>· WEP course at KAUST, Saudi Arabia. Jan 2010 &amp; 2014. (Lecturer)</li><li>· DRWA13 Summer workshop, September 2013. (Lecturer)</li><li>· Scientific Computing for DPhil Students. (TA/Marker)</li></ul> <b>St Hugh's College</b> , Oxford, UK <i>Non-stipendiary Lecturer of Mathematics</i> <i>Tutor</i> Undergraduate courses <ul style="list-style-type: none"><li>· Part A (Complex) Analysis</li><li>· Part A Numerical Analysis</li></ul>	<b>January 2019 – Present</b> <b>March 2016 – December 2018</b> <b>March 2014 – February 2016</b> <b>April 2011 – February 2014</b> <b>October 2009 – April 2011</b> <b>October 2009 – February 2014</b> <b>October 2007 – June 2009</b> <b>October 2008 – February 2014</b> <b>October 2007 – October 2008</b>

## RESEARCH

- SELECTED PUBLICATIONS
- (1) N. Hale, An ultraspherical spectral method for linear Fredholm and Volterra integro-differential equations of convolution type, *IMA J. Num. Anal.*, (accepted 2018).
  - (2) N. Hale & S. Olver, A fast and spectrally convergent algorithm for rational-order integral and differential equations, *SIAM J. Sci. Comp.*, *SIAM J. Sci. Comp.*, 2018.
  - (3) N. Hale & J.A.C. Weideman, Contour integral solution of elliptic PDEs in cylindrical domains, *SIAM J. Sci. Comp.*, 2015.
  - (4) N. Hale & A. Townsend, A fast FFT-based discrete Legendre transform, *IMA J. Num. Anal.*, 2015
  - (5) N. Hale & K. Xu, Explicit construction of rectangular differentiation matrices, *IMA J. Num. Anal.*, 2015.
  - (6) T. Driscoll & N. Hale, Rectangular spectral collocation, *IMA J. Num. Anal.* 2015.
  - (7) T. Driscoll, N. Hale, & L.N. Trefethen, Chebfun Guide (1st edition), *Pafnuty Publications*, (2014).
  - (8) N. Hale & A. Townsend, An algorithm for the convolution of Legendre series, *SIAM J. Sci. Comp.*, 2014.
  - (9) N. Hale & A. Townsend, A fast, simple, and stable Chebyshev–Legendre transform using an asymptotic formula, *SIAM J. Sci. Comp.*, 2014.
  - (10) N. Hale & A. Townsend, Fast and accurate computation of Gauss–Legendre and Gauss–Jacobi quadrature nodes and weights, *SIAM J. Sci. Comp.*, 2013.
  - (11) N. Hale & L.N. Trefethen, Chebfun and numerical quadrature, *Science in China*, 2012.
  - (12) K. Burrage, N. Hale & D. Kay, An efficient FEM implementation for fractional-in-space reaction-diffusion equations, *SIAM J. Sci. Comp.*, 2012.
  - (13) R. McKibbin, N. Hale, R. W. Style & N. Walters, Convection and heat transfer in layered sloping warm-water aquifers, *J. Porous Media*, 2011.
  - (14) N. Hale & T.W. Tee, Conformal maps to multiply-slit domains, *SIAM J. Sci. Comp.*, 2009.
  - (15) N. Hale, N.J. Higham & L. N. Trefethen, Computing  $A^\alpha, \log(A)$ , and related matrix functions by contour integrals, *SIAM J. Num. Anal.*, 2008.
  - (16) N. Hale & L.N. Trefethen, New quadrature methods from conformal maps, *SIAM J. Num. Anal.*, 2008.

IMPACT FACTORS (WEB OF SCIENCE)	<i>SIAM J. Sci. Comp.</i>	Impact factor: 2.803.	Number of publications 7.
	<i>SIAM J. Num. Anal.</i>	Impact factor: 2.537.	Number of publications 2.
	<i>IMA J. Num. Anal.</i>	Impact factor: 1.985.	Number of publications 4.

METRICS (WEB OF SCIENCE)	Total peer-reviewed journal publications:	13	POST-GRADUATE SUPERVISION	PhD students:	1 (in progress)
	Total citations (excluding self-cites):	263		Masters students:	1
	Average Citations per paper:	20.85		Honours students:	6
	Most highly cited paper:	74 citations		AIMs essay students:	5
	h-index:	7			

## TEACHING & LEARNING

MODULES TAUGHT AT STELLENBOSCH UNIVERSITY	<b>NM262 Numerical methods (Engineering)</b> <ul style="list-style-type: none"><li>• Years taught: 2014 – 2018</li><li>• Role: Course coordinator</li></ul>	<ul style="list-style-type: none"><li>• Number of students: <math>\pm 400</math> (undergraduates)</li><li>• Website: <a href="http://appliedmaths.sun.ac.za/NM262/">http://appliedmaths.sun.ac.za/NM262/</a></li></ul>
	<b>TW244 Applied Differential Equations (Science)</b> <ul style="list-style-type: none"><li>• Years taught: 2016 – 2018</li><li>• Role: Lecturer</li></ul>	<ul style="list-style-type: none"><li>• Number of students: <math>\pm 100</math> (undergraduates)</li><li>• Website: <a href="http://appliedmaths.sun.ac.za/TW244/">http://appliedmaths.sun.ac.za/TW244/</a></li></ul>
	<b>TW324 Numerical methods (Science)</b> <ul style="list-style-type: none"><li>• Years taught: 2014 – 2018</li><li>• Role: Coordinator (2014 &amp; 2015), Lecturer (2016 – 2018)</li></ul>	<ul style="list-style-type: none"><li>• Number of students: <math>\pm 50</math> (undergraduates)</li><li>• Website: <a href="http://appliedmaths.sun.ac.za/TW324/">http://appliedmaths.sun.ac.za/TW324/</a></li></ul>
	<b>TW776 Numerical linear algebra (Applied Maths (Hons) &amp; Engineering (MEng))</b> <ul style="list-style-type: none"><li>• Years taught: 2017 &amp; 2018</li><li>• Role: Lecturer</li></ul>	<ul style="list-style-type: none"><li>• Number of students: <math>\pm 50</math> (post-graduates)</li><li>• Website: <a href="http://appliedmaths.sun.ac.za/TW776/">http://appliedmaths.sun.ac.za/TW776/</a></li></ul>

TEACHING SCORES 2016: 4.26, 85%, 2017: 4.21, 85%, 2018: 4.36, 86%, 2019: 4.22, 87%

SELECTED QUOTES FROM TEACHING EVALUATIONS “Dr Hale is an excellent professor and explains everything very clearly. He is approachable and has made this my favourite module”, “Enthusiasm”, “Effort put into the learning material. Great structure of online slides”, “Enthusiasm, friendly attitude”, “Lecturer communicated clearly”, “Lecturer was always organised”, “Sense of humour”, “Clear and descriptive communication”, “Best lecturer I had this year”, “All hail Dr Nick”