

CONTACT INFORMATION	<p>Mechanical Engineering The University of Sheffield Mappin Street Sheffield, UK, S1 3JD</p>	<p><i>E-mail:</i> arturgower [at] gmail <i>Website:</i> arturgower.github.io</p>
RESEARCH INTERESTS	Wave propagation, random media, solid mechanics, and supervised machine learning.	
PROGRAMMING	Julia, Mathematica, C, C++, Matlab, Bash, and T _E X (L ^A T _E X, B _I B _T E _X , TikZ).	
ACADEMIC HISTORY	<p>The University of Sheffield, UK Lecturer in Dynamics, Mechanical Engineering 01/2019 – present</p> <p>University of Manchester, UK Research associate, Applied Mathematics 10/2015 – 12/2018</p> <ul style="list-style-type: none"> • <i>Ultrasonic propagation in complex media</i> - EPSRC (EP/M026205/1) • Responsible for mathematical modelling and numerical implementation. Strong ties with experiments (EP/M026310/1) and simulations (EP/M026302/1) <p>NUI Galway, Ireland Ph.D. Applied Mathematics 09/2011 – 09/2015</p> <ul style="list-style-type: none"> • Thesis title: <i>Incremental elastic surface waves and static wrinkles</i> • Supervisor: Prof. Michel Destrade <p>University of Campinas, Brazil (QS 2nd best university in Latin America) M.Sc. Applied Mathematics, Grade 96% 03/2009 – 05/2011 Computational geophysics group</p> <ul style="list-style-type: none"> • Thesis: <i>Nonlinear Elasticity with Radial Symmetry</i> • Emphasis in wave scattering and propagation in Geophysics. <p>B.Sc. Applied Mathematics, Grade 83% 03/2005 – 12/2008</p> <ul style="list-style-type: none"> • Emphasis on Mechanics with a minor in Computer Science 	
TEACHING EXPERIENCE	<p>Qualification Teaching and learning course - (5 ECTS) NUI Galway 2013</p> <p>University of Sheffield <i>Modules</i> 09/2014 – 06/2015</p> <ul style="list-style-type: none"> • The Dynamics of Aerospace Structures (AER291). I gave lectures and prepared content for BEng and MEng Aerospace. I provided feedback through Discussion Forums and recorded videos. 01/2020 – 06/2020 • Matlab for Engineers (MEC133). I developed all the content and gave lectures. The learning was based around a series of interactive problems to solve using Matlab Grader. I provided feedback through live online meetings, recorded videos, and a Discussion Forum. 10/2020 – 06/2021 <p>University of Manchester <i>Supervision</i></p> <ul style="list-style-type: none"> • Informal Ph.D supervisor, Erik Garcia Neefjes, working on thermo-visco-elastic waves. Erik is on track to complete his PhD on time. 09/2017 – present 	

- Final year undergraduate on *Acoustic Scattering from Cylinders*. Janni Harju compared multiple scattering theory with numerical software. **2018**
- Summer intern *Modelling the Bladder using Non-Linear Elasticity*. Imagining the bladder as a rubber material, Farid Breffni Hounat found the optimal material to sustain varied internal fluid pressure. **2017**
- Summer intern *Using elastic waves to measure initial stress*. Sara Ilhac related bulk wave speeds with directions of tension. **2016**

Tutorials

09/2015 – 06/2018

- Led problem solving classes on calculus, linear algebra, complex analysis for B.Sc. mathematics and B.Sc. engineering 1st to 2nd year students.
- Marked and provided constructive feedback on weekly assignments.

NUI Galway

Tutorials and lectures

09/2014 – 06/2015

- Taught tutorials, and occasional lectures, on Fluid Mechanics and Nonlinear Elasticity to final year B.Sc. mathematics students.
- Marked and provided constructive feedback on weekly assignments.

Tutorials

09/2011 – 06/2014

- Led problem solving classes on vector calculus, mathematical modelling, linear algebra, mathematical methods for B.Sc. mathematics and engineering.
- Marked exams and gave in class feedback.

Drop-in centre

03/2012 – 11/2014

- Taught at the centre for the [Support for Undergraduate Mathematics](#).

University of Campinas

Lectures

02/2010 – 07/2010

- Lectured on Linear Algebra to B.Sc. engineering 1st year students.
- Prepared lectures, wrote and graded exams.

Pas Facamp (Charity)

07/2009 – 09/2009

- Taught basic finance to the local community.

FUNDING

Video odometry to report rough rides

09/2021 - 04/2022

Principal Investigator: Reliable Data Systems International (www.rdsintl.com), Artur L. Gower

Funding Value: £70k

Funder: Network Rail - [Research challenge](#)

Sensing Dense Particulate Materials

07/2021 - 12/2023

Principal Investigator: Artur L. Gower

Funding Value: £232k

Funder: EPSRC [EP/V012436/1](#)

Determination of particle attributes via novel active acoustics

10/2021 - 10/2025

Principal Investigator: Artur L. Gower

Partner: [Johnson Matthey](#)

Funding Value: £120k

Funder: EPSRC Industrial CASE (ICASE)

FAST - Fast Analysis of Stress in rail Tracks: an ultrasonic method **2020 - 2021**

Principal Investigator: Robert Dwyer-Joyce, Artur L. Gower, Roger Lewis

Funding Value: £86k

Funder: European Commission - Horizon 2020 / H2020, In2Track2 (Main Funder),
Network Rail Limited
Longitudinal Rail Stress Measurement using Ultrasound **2019 - 2021**
Principal Investigator: Robert Dwyer-Joyce, Artur L. Gower, Roger Lewis
Funding Value: \$150k

Funder: Federal Railroad Administration (USA)
EPSRC, Postdoctoral Fellowship (unsuccessful, rank 7/35) **2018**
Title: Predicting the properties of particulate materials from backscattered waves
Principal Investigator: Artur L. Gower
Funding Value: N/A

[Irish Research Council](#), PhD fellowship **09/2013 - 09/2015**
Title: Nonlinear modelling of soft matter
Principal Investigators: Artur L. Gower and Michel Destrade
Funding Value: €46k

[Hardiman Scholarship](#), PhD fellowship **09/2011 - 09/2013**
Title: Skin deep: the mechanics of skin
Principal Investigators: Artur L. Gower and Michel Destrade
Funding Value: €42k

[Brazilian National Council for Scientific and Technological Development](#),
M.Sc. fellowship (rank 1/45) **02/2009 - 03/2011**
Title: Nonlinear elastodynamics with radial symmetry
Principal Investigator: Artur L. Gower
Funding Value: R\$29k (\approx £5.5k)

[Sao Paulo Research Foundation](#) Undergraduate Research Scholarship
Title: Acoustic diffraction with Kirchhoff modelling **03/2007 - 02/2008**
Principal Investigator: Artur L. Gower and Lucio T. Santos
Funding Value: R\$6k (\approx £1.1k)

Title: Introduction to discrete chaotic dynamics **03/2006 - 02/2007**
Principal Investigator: Artur L. Gower and Lucio T. Santos
Funding Value: R\$6k (\approx £1.1k)

RECENT SOFTWARE

- [S3] A.L. Gower and J. Deakin. A Julia library for simulating, processing, and plotting multiple scattering of waves. [MultipleScattering.jl](#), GitHub, MIT License.
- [S2] A.L. Gower. A Julia library to calculate the effective wave reflection and transmission in material random materials. [EffectiveWaves.jl](#), GitHub, MIT License.
- [S1] A.L. Gower. A Mathematica package that uses the concept of entropy maximisation to calculate the influence on a GO board. [EntropyGO](#), GitHub, MIT License.

SUBMITTED

- [19] E.G. Neefjes, D. Nigro, A.L. Gower, R.C. Assier, V.J. Pinfield, W.J. Parnell, “A unified framework for linear thermo-visco-elastic wave propagation including the effects of stress-relaxation”, *Proceedings of the Royal Society A* (preprint) accepted, (2022)
- [18] G.Y. Li, A.L. Gower, M. Destrade, S.H. Yun, “Non-destructive mapping of stress, strain and stiffness of thin elastically deformed materials”, *Communications Physics* (preprint) accepted, (2022)

REFEREED JOURNAL PAPERS

- Total citations: 419, according to [Google Scholar](#).
- [17] A.L. Gower, G. Kristensson, “Effective waves for random three-dimensional particulate materials”, *New Journal of Physics* (preprint), (2021)
 - [16] G.Y. Li, A.L. Gower, M. Destrade, “An ultrasonic method to measure stress without calibration: The angled shear wave method”, *The Journal of the Acoustical*

- Society of America (preprint), 148(6) (2020)
- [15] A.L. Gower, W.J. Parnell, I.D. Abrahams, “Multiple Waves Propagate in Random Particulate Materials”, *SIAM Journal on Applied Mathematics* (preprint), 79.6 (2019)
 - [14] A.L. Gower, I.D. Abrahams, W.J. Parnell, “A proof that multiple waves propagate in ensemble-averaged particulate materials”, *Proceedings of the Royal Society A* (preprint), 475.2229 (2019)
 - [13] A.L. Gower, R.M. Gower, J. Deakin, W.J. Parnell, I.D. Abrahams, “Characterising particulate random media from near-surface backscattering: A machine learning approach to predict particle size and concentration”, *Europhysics Letters*, (2018) 122 (5)
 - [12] A.L. Gower, M.J.A. Smith, W.J. Parnell, I.D. Abrahams, “Reflection from a multi-species material and its transmitted effective wavenumber”, *Proceedings of the Royal Society A* (preprint), 474.2212 (2018)
 - [11] A. Agosti, A.L. Gower, P. Ciarletta, “The constitutive relations of initially stressed incompressible Mooney-Rivlin materials”, *Mechanics Research Communications*, 93, (2018)
 - [10] A.L. Gower, T. Shearer, P. Ciarletta, “A new restriction for initially stressed elastic solids”, *Quarterly Journal of Mechanics and Applied Mathematics*, 70(2017)
 - [9] M. Carfagna, M. Destrade, A.L. Gower, A. Grillo, “Oblique wrinkles”, *Philosophical Transactions of the Royal Society A*, Invited contribution to the themed issue on *Patterning through instabilities in complex media*, 375(2017)
 - [8] P. Ciarletta, M. Destrade, A.L. Gower, M. Taffetani, “Morphology of residually stressed tubular tissues: beyond the elastic multiplicative decomposition”, *Journal of the Mechanics and Physics of Solids*, 90 (2016)
 - [7] P. Ciarletta, M. Destrade, A.L. Gower, “On residual stresses and homeostasis: an elastic theory of functional adaptation in living matter”, *Scientific Reports*, 6 (2016)
 - [6] R.M. Gower, A.L. Gower, “High order reverse automatic differentiation with emphasis on the third order”, *Mathematical Programming SERIES A*, 155 (2016)
 - [5] A.L. Gower, P. Ciarletta, M. Destrade, “Initial stress symmetry and its application in elasticity”, *Proceedings of the Royal Society A*, 471 (2015)
 - [4] A.L. Gower, “Connecting the material parameters of soft fibre-reinforced solids with the formation of surface wrinkles”, *Journal of Engineering Mathematics*, Special Issue on Fibre-Reinforced Materials, 95 (2015)
 - [3] D.R. Nolan, A.L. Gower, M. Destrade, R.W. Ogden, J.P. McGarry, “A robust anisotropic hyperelastic formulation for the modelling of soft tissue”, *Journal of the Mechanical Behavior of Biomedical Materials*, 39 (2014)
 - [2] A.L. Gower, M. Destrade, R.W. Ogden, “Counter-intuitive results in acousto-elasticity”, *Wave Motion*, Special Issue in Honour of V.I. Alshits, 50 (2013)
 - [1] P. Ciarletta, M. Destrade, A.L. Gower, “Shear instability in skin tissue”, *Quarterly Journal of Mechanics and Applied Mathematics*, 66 (2013)
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- [6a] A.L. Gower, Chapter: “Generating feasible solutions: part 1”, In: Automatic Optimised Design of Umbilicals (ESGI 100), *MIIS Eprints Archive*, 710 (2016)
 - [3a] A.L. Gower, Chapter: “Elimination of errors from track line detection”, In: Train Positioning Using Video Odometry (ESGI 116), *MIIS Eprints Archive*, 672 (2014)
 - [1b] A.L. Gower, C. Brett, J. Herterich, K. Katterbauer, A. Melnik, J. Thompson, “Modelling of abrasive waterjet etching” (OCCAM 4th Modelling Camp), (2012)

TECHNICAL
REPORTS

- [1a] A.L. Gower, “Detecting Geometric Faults from Measured Data” (ESGI 85), *MIIS Eprints Archive*, 659 (2012)

ACADEMIC SERVICES

Reviewer:

Proceedings of the Royal Society A | *International Journal of Non-Linear Mechanics* | *IMA Journal of Applied Mathematics* | *SIAM Journal of Applied Mathematics* | *ZAMP* (Journal of Applied Mathematics and Physics) | *Journal of the Acoustical Society of America* | *Acta Acustica United with Acustica*

OUTREACH

- **24hr Inspire for Life.** A talk on ”Sensing the world with sound”. These science talks raise money for cancer charities. **03/2020**
- **Pint of Science - Sheffield.** A talk about science to the general public. **05/2019**
- **The New Scientist Live.** A science festival that attracts over 30,000 visitors. I demonstrated acoustic levitation and other phenomena over a weekend. **09/2018**
- **Science Showdown! *How can we measure the invisible: the mathematics of jiggly waves.*** A talk promoting maths to a wider audience in Manchester. **03/2017**
- **Science Experience Workshop:** on open days we gave potential students a hands on science experience. I ran a stand on maths/physics puzzles. **2011 - 2014**
- **Maths Enrichment:** Teach two morning sessions preparing students for the Irish and international mathematics Olympiad. **2014**
- **School Presentation for the School of Science:** Two school visits to engage with students about studying science at university. **2011**

LEADERSHIP

- **Early Career Group - UK Acoustics Network (*Coordinator*)** **9/02/2018–present**
Two summer schools to train early career acousticians (6–9/08/2018, 5–9/08/2019), and a workshop on academic-industrial collaboration (8–9/04/2019).
- **Constitutive Behaviour of Soft Tissues** (*Co-organiser*) **31/08–2/09 2016**
A workshop to establish the state-of-the-art in constitutive behaviour of soft tissues.
- **Joint Symposium: Irish Mechanics Society and Irish Society for Scientific Engineering & Computation** (*Co-organiser*) **8–9/11/2014**
An annual international mechanics conferences
- **Irish Applied Maths Research Students’ Meeting** (*Co-organiser*) **11/10/2014**
Organized by the SIAM student chapter, this was the first meeting of postgraduates working in applied mathematics across Ireland.
- **Stokes Modelling Workshop** (*Co-organiser*) **23–26/06/2014**
A modelling workshop to solve problems brought by industry, in the same style as the European Study Groups with Industry.

RECENT TALKS

Below are recent invited talks from workshops/conferences/seminars.

- **UCL Applied Maths Seminar,** “Multiple waves propagate in complex media”, London, UK **03/2020**
- **Cardiff - Applied and Computational Mathematics Seminar,** “Waves in Particulate Materials”, Cardiff, UK **02/2020**
- **International Congress on Industrial and Applied Mathematics (ICIAM2019),** talk in symposium “Waves in multiple-scattering media”, Valencia, Spain **06/2019**
- **Strathclyde Applied Mathematics Seminar,** “Waves in Particulate Materials: Beyond Low Frequencies”, Glasgow, UK **05/2019**
- **Wave Chaos Seminar,** “Waves in complex random media”, Wave Modelling Research Group, Nottingham, UK **10/2018**
- **I. David Abrahams 30th workshop,** “Waves in random particulate materials”, Isaac Newton Institute for Mathematical Sciences (INI), Cambridge, UK **09/2018**

- Research seminar, “Using machine learning to characterise complex materials”, Malvern Panalytical Ltd, Malvern, UK **08/2018**
- Bremen Workshop on Light Scattering 2018, “Characterising particulate random media from near-surface backscattering, Bremen, Germany **03/2018**
- Meeting of the Acoustical Society of America, 141 (5), 3810-3810, “Characterizing composites with acoustic backscattering: Combining data driven and analytical methods”, Boston, USA **06/2017**
- New mathematics for a safer world: wave propagation in heterogeneous materials, “Characterising random composites with acoustic backscattering”, International Centre for Mathematical Sciences (ICMS), Edinburgh, UK **06/2017**
- Constitutive behaviour of soft tissues, “Constitutive modelling of initially stressed elastic solids”, Manchester, UK **09/2016**