Curriculum Vitae – Dr Hao Gao

Affiliation

Position:	Lecturer in Applied Mathematics
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Vision

To become an international leading mathematical modeller in cardiovascular research, focusing on patient-specific multi-scale/-physics image-based modelling, developing tools for mathematicians, modellers, experimenters and clinicians, towards making translational and exciting discoveries applicable to clinical practice.

Appointments

04/2020	Lecturer in Applied Mathematics
04/2016 – present	Research Fellow & Proleptic Lecturer School of Mathematics and Statistics, University of Glasgow *MI modelling in SoftMech Centre funded by EPSRC*
04/2012 – 03/2016	Research Fellow School of Mathematics and Statistics, University of Glasgow *1. Funded by a BHF project "First steps towards modelling myocardial infarction"* *2. Funded by a EPSRC project "Finite element-immersed boundary method and its application to mitral valves". till 2015.03* *3. A key player in the GlasgowHeart consortium (www.glasgowheart.org), developing novel patient-specific heart and valve models based on clinical imaging data.*
11/2010 – 03/2012	Post-Doctoral Research Fellow Institute of Cardiovascular and Medical Science, University of Glasgow; EEE Department, University of Strathclyde, UK *Initiating the GlasgowHeart consortium with Profs Luo/Berry/Soraghan, working on image processing towards patient-specific computational models.*

Education/Quantifications

PhD in Biomechanics	Brunel University, UK, 11/2010 *Thesis: Carotid plaque stress analysis by fluid structure interaction based on in-vivo MRI: Implications to plaque vulnerability assessment, Brunel University.* *Viva date: 14th October 2010* *Vice-Chancellor's Prize for Doctoral Research, 2011*
Master of Engineering	Fudan University, China, 07/2006 *Subject: Biomedical Engineering, final mark: 93/100*
Bachelor of Science	Fudan University, China, 07/2003 *Subject: Theoretical and Applied Mechanics, top 5*

Research Profile

- Solid knowledge on general fluid/solid mechanics, biomechanics (biofluid and biosolid), and numerical methods including finite difference/volume/element methods;

- Extensive experience in image-based biomechanical cardiovascular modelling;
- Expertise in image processing and image-based 3D computational model construction;
- Proficient programming ability including C/C++, Matlab, and extensive experience in a range of numerical software packages including ANSYS, ABAQUS, SolidWorks

Teaching Experience

- 07/2020 – 08/2020 online lecturing for NPU Summer School,'Computational Cardiology: Foundation and Frontier'
- 01/2018 – 03/2018 Lecturing Math 1S along with one tutorial session
- 09/2016 Instructor in Glasgow Mathematics for Industry Modelling Week
- 06/2016–09/2016 Supervising Msc projects, University of Glasgow
- 01/2015–03/2015 Lecturing in 5th year elasticity (MSc), University of Glasgow
- 01/2013–02/2013 Lecturing in 4th year continuum mechanics, University of Glasgow
- 11/2010–present Assisting in supervising master/PhD students, University of Glasgow
- 10/2007–08/2010 Lab demonstrator (biofluid, image processing), Brunel University
- 09/2004–01/2005 Teaching assistant in biofluid mechanics, Fudan University

Training & Development

- 01/2018 – 12/2019 Early career development program, University of Glasgow
- Research training for early career researchers, University of Glasgow, 2015
- Skills training for research students (30 credits), Brunel University, 2007-2009
- Brunel Associate Practitioner Pathway in Learning and Teaching in Higher Education, 2008-2009

Funding Applications

1. PI in ESPRC Capital Award 2018 – 2020, together with Dr. Victor Rodin from Glasgow Experimental MRI Centre, MVLS. £23,650
2. CI in "The SofTMech Statistical Emulation and Translation Hub" funded by EPSRC, 2020-2024, £1.3 million
3. CI in Centre-to-Centre bid 'EPSRC Centre for Multiscale soft tissue mechanics with MIT and POLIMI (SofTMech-MP)', 2020 – 2024, EPSRC, £1.6 million
4. CI in EPSRC project 'Growth and Remodelling in the Porcine Heart — Pushing Mathematics through Experiments', 2019 – 2021, £387,321
5. CI and Named researcher in "EPSRC Center for Multiscale Soft Tissue Mechanics - with applicaiton to heart & cancer", EP/N014642/1, 04.2016 – 03.2020, £2.0 million
6. CI and the named researcher in the BHF funded project (PG/14/64/31043): "First steps towards modelling myocardial infarction (a computed MI Physiome): A case-control study of novel biomechanical parameters in acute MI survivors with left ventricular dysfunction." 04.2015 – 03.2017
7. CI in GSK funded project, "Investigation of post-myocardial infarction injury based on novel mathematical models and clinical cardiac magnetic resonance imaging (CMR) methodologies", £468,095, 2017 – 2020
8. CI in EPSRC IAA project "Mathematical modelling of cardiac amyloidosis and related interstitial cardiac pathologies ", co funded by GSK and GU, £25,146, 2017
9. CI in PhD student project co-funded by GSK and GU: "Statistical and mathematical modelling of cardiac amyloidosis and related interstitial cardiac pathologies", £75,480, 2017-2021

10. PhD student project co-funded by GSK and GU: "Quantitative analysis of longitudinal changes in myocardial perfusion using cardiac MRI", £75,480, 2017-2021
11. CI in IAA application, 'Tracking biomarkers of heart attacks using a fast statistical emulator based on heart modelling and in vivo MRI', £48,267, 2016.10 – 2017.04
12. PI in feasibility fund from SofTMech, "implementing parallel computing in FEAP for cardiac mechanics", £6500, 11.2017 – 05.2018
13. PI in feasibility fund from SoftMech, "Development of AI-Segmentation and Registration for Heart Imaging", £4000, 11.2018 – 10.2019
14. Co-applicant in China NSF funded project with Dr. Li Cai, Northwestern Polytechnic University, "Numerical methods in diseased heart with electro-mechanics coupling and their application", RMB520,000, 2019 – 2023
15. CI in Royal Society Royal Society-Newton Mobility Grant on "Towards the next generation stenting - The evaluation and study on mechanics behaviour of novel shape memory polymer stent", £12,000, 2018-2020
16. NSFC-RS joint project with Prof. Ying He, Dalian University of Technology, 'Biomechanical Researches on Hemorhological Alterations in Diabetic Microcirculation', deadline 2016.10
17. CI in PICS project application, 'Physical modelling of normal and pathological speech production for static or mobile wall structures', led by Dr. Anne Van Hirtum,Grenoble University, France. 2016
18. Collaborating in Mr Kenneth Mangion's clinical fellowship grant funded by BHF (FS/15/54/31639): "Myocardial strain measurements in survivors of acute ST elevation myocardial infarction: implementation and prognostic significance of novel magnetic resonance imaging methods." 09.2015 - 2017.08
19. Involved in a EU project (Horizon 2020) on heart failure, led by Dr. Einar Heiberg (Lund University, Sweden).
20. Five year MRC career development award fellowship application was submitted on 24th September, 2014, based in School of Mathematics and Statistics, University of Glasgow.
21. Named researcher and co-investigator in the EPSRC grant application "Heart Remodelling after infarction – modelling cardiac growth and altered mechanics, and their clinical significance".
22. Named researcher and co-investigator in the MRC grant application "Rabbit Heart Remodelling after Infarction – A Combined Mathematical and Experimental Study".
23. CI in EPSRC project 'Predicting the Long-Term Outcome of Percutaneous Mitral Valve Repair with MitraClip NT', submitted 2018, not funded

Awards & Achievements

- Presentation in STEM for BRITAIN, March 2017, the House of Commons
- BSCMR Young Investigator Award, – shortlist/runner up, 2016
- Travel grant from British Council to attend the workshop on Mathematical and Computational Modelling in Cardiovascular Problems, April 2014, Moscow
- Travel fund to attend 2nd Meeting of the EPSRC Patient-Specific Modelling Network, Edinburgh, 2011
- Vice-Chancellor's prize for Doctoral Research, Brunel University (Best PhD thesis, 2011)
- BHF Travel Award for attending the 16th Finite Element Workshop 2009, Germany
- Vice-Chancellor's Prize (Brunel University) to attend the SBC ASME (2009), USA
- Winner of 'The 2008 ANSYS Wall Planner Competition'

- BHF Travel Award to attend the SBC ASME (2008), USA
- Young Researchers Futures Meeting on Study and treatment of cardiovascular disease: Devices and Fluidics, Imperial College, 2008
- Vice-Chancellor's Prize (Brunel University) to attend the European Society of Biomechanics Workshop, 2007
- 1st Guanghua Postgraduate Scholarship, Fudan University, 2005
- 2nd Postgraduate Scholarship, Fudan University, 2004
- Excellent Student Scholarship in Mechanical Department, Fudan University, 2004
- 2nd National Scholarship, China, 2002
- Sanjin International Scholarship, Fudan University, 2000

Professional Activity

- Participating the Patient Engagement day, 20th May 2019 at Golden Jubilee Hospital
- Co-organizer of 4th soft tissue modelling workshop, University of Glasgow, June 2019
- Session-chair of BAMC 2019, Bath, April 2019
- Co-chair of Computational soft tissue cardiac mechanics III, ECCM-ECFD, Glasgow, June 2018
- Organizing and chairing the mini-symposia: Multi-scale Soft Tissue Modelling: Parameter Inference, St. Andrews, 26-29th March, BAMC, 2018
- Attending Shape analysis and computational anatomy, Issac Newton Institute for Mathematical Sciences, 11.2017
- Co-organizer of 3rd soft tissue modelling workshop, University of Glasgow, 06.2017
- Session chair in BAMC 2017, University of Surrey, 04.2017
- Assisting in organizing in Dialogue on Heart Failure and chairing, Glasgow, 04.2016
- Member of Outreach Community in SoftMech Centre (www.softmech.org), since 2016
- Insigneo Showcase 2016 on behalf of SoftMech Glasgow Group, 05.2016
- Co-organizer of 2nd soft tissue modelling workshop, University of Glasgow, 06.2015
- Organizer of GlasgowHeart consortium committee meeting and website updating, University of Glasgow, 2010 to present (www.glasgowheart.org)
- Organizer of mathematical biology seminar in School of mathematics and statistics, University of Glasgow, 2012 to 2014
- Co-organizer of the 1st International symposium on computing in cardiology, Northwestern Polytechnic University, China, 2014
- Co-organizer of Research Student & RA Meeting, CMALs, University of Glasgow, 2013
- Contributions to grant funding applications within the group
- Member of International Society of Electrocardiology
- Invited reviewer for mathematics and biomechanics journals: Mathematical Medicine and Biology, Journal of Computational Medicine, Journal of the Mechanical Behaviour of Biomedical Materials, Journal of Biomechanics, Biomedical Engineering online, Plos One

Invited Talks

- JSPS Core-to-Core meeting, MMDS, Osaka University, October 2020
- Living HeartProject SIG MV modelling, February, 2020
- CMALS seminar, University of Glasgow, March 2019

- Institute of Natural Science, SJTU, China, 12.2018
- 5th European Congress on eCardiology and eHealth will take place in Moscow, Russia on 29-30 October 2018
- School of Traffic & Transportation Engineering of Center South University, 06, 2018
- School of applied mathematics, Xi'an University of Technology, 06, 2018
- The 3rd computing in cardiology, Northwestern Polytechnical University, 06.2018
- Biomedical Engineering Department, Chongqing University, 12.2017
- Mathematical Department, Northwestern Polytechnical University, 12.2017
- EPSRC Math Centre, University of Liverpool, 09.2017
- EPSRC POEMS workshop, Computational modelling in Healthcare
- The 2nd International Symposium on Computing in Cardiology, XiAn,07.2016
- Chinese Doctorate Forum in University of Glasgow, Glasgow,11.2015
- PASC15 on mitral valve modelling using immersed boundary method, Zurich Switzerland, 06.2015
- Mathematical Department, Northwestern Polytechnical University, 12.2014
- Biomedical Engineering Department, Southeast University, 12.2014
- Biomedical Engineering Department, Chongqing University, 12.2014

Publication List

1. W. Li, H. Gao, K. Mangion, B. Colin, and X. Luo. Apparent growth tensor of left ventricular post myocardial infarction – in human first natural history study, 2020, submitted
2. A. Lazarus, H. Gao, X. Luo, and D. Husmeier. Improving cardio-mechanic inference by combining in-vivo strain data with ex-vivo volume-pressure data, 2020, submitted
3. Y. Wang, L. Cai, X. Feng, X. Luo, and H. Gao. A ghost structure finite difference method for a fractional fitzhugh-nagumo monodomain model on moving irregular domain, 2020, submitted
4. L. Cai, L. Ren, Y. Wang, Y. Li, W. Xie, and H. Gao. Surrogate models based on machine learning methods for parameter estimation of left ventricular myocardium, 2020, submitted
5. D. Guan, J. Yao, X. Luo, and H. Gao. Effects of myofibre architecture on neonatal porcine ventricular pump function. *Royal Society Open Science*, 7(4):191655, 2020
6. W. Li, A. Clanzs, Gao, Hao, A. Martinez, N. De Azcona, M. Fontana, P. Hawkins, S. Biswas, R. Janiczek, C. Jennifer, C. Berry, D. Husmeier, and X. Luo. Passive biomechanical property modelling of human left ventricle with amyloid. *Frontier in Physiology*, Accepted, 2020
7. S. Chen, C. R. Sari, H. Gao, Y. Lei, P. Segers, M. De Buele, G. Wang, and X. Ma. Mechanical and morphometric study of mitral valve chordae tendineae and related papillary muscle. *Journal of the Mechanical Behavior of Biomedical Materials*, in revision:104011, 2020
8. Y. Wang, H. Lan, T. Yin, Y. Wang, S. McGinty, H. Gao, G. Wang, and Z. Wang. Covalent immobilization of biomolecules on stent materials through mussel adhesive protein (map) coating to form biofunctional films. *Material Science & Engineering*, accepted
9. L. Cai, Y. Wang, H. Gao, X. Ma, G. Zhu, R. Zhang, X. Shen, and X. Luo. Some effects of different constitutive laws on simulating mitral valve dynamics with fsi. *Scientific Reports*, accepted, 2019
10. Y. Wang, L. Cai, X. Luo, W. Ying, and H. Gao. Simulation of action potential propagation based on the ghost structure method. *Scientific Reports*, accepted, 2019

11. L. Feng, H. Gao, S. Niederer, and X. Luo. Analysis of an imaged-derived hyperelastic model of left atrium, coupled to mitral valve and fluid-structure interaction. *International Journal for Numerical Methods in Biomedical Engineering*, accepted
12. L. Cai, M. Guo, X. Feng, W. Ying, H. Gao, and X. Luo. Nonstandard finite difference method for nonlinear riesz space fractional reaction-diffusion equation. *International Journal of Numerical Analysis and Modeling*, 16:925–938, accepted
13. Z. Duanmu, W. Chen, H. Gao, X. Yang, X. Luo, T. Wang, and N. Hill. A computational model of the coronary arterial tree. *Frontiers Physiology*, accepted
14. V. Davies, U. Noè, A. Lazarus, H. Gao, B. Macdonald, C. Berry, X. Luo, and D. Husmeier. Fast parameter inference in a biomechanical model of the left ventricle using statistical emulation. *submitted to Journal of the Royal Statistical Society: Applied Statistics, arXiv preprint arXiv:1905.06310*, accepted, 2019
15. U. Noe, A. Lazarus, H. Gao, V. Davies, B. Macdonald, K. Mangion, C. Berry, X. Luo, and D. Husmeier. Gaussian process emulation to accelerate parameter estimation in a mechanical model of the left ventricle: a critical step towards clinical end-user relevance. *Journal of the Royal Society: Interface*, 2019
16. D. Guan, F. Ahmad, P. Theobald, S. Soe, X. Luo, and H. Gao. On the aic-based model reduction for the general holzapfel–ogden myocardial constitutive law. *Biomechanics and modeling in mechanobiology*, pages 1–20, 2019
17. L. Feng, N. Qi, H. Gao, W. Sun, M. Vazquez, B. Griffith, and X. Luo. On the chordae structure and dynamic behaviour of mitral valve. *IMA Applied Mathmatics*, online first:hxy035, IMA Journal of Applied Mathematics, 2018
18. X. Zhuan, X. Luo, H. Gao, and R. Ogden. Coupled agent-based and soft tissue modelling of lv post myocardial infarction. *International Journal for Numerical Methods in Biomedical Engineering*, accept, 2018
19. K. Mangion, H. Gao, D. Husmeier, X. Luo, and C. Berry. Recent developments in personalized medicine using image-based biomechanical modelling in myocardial infarction. *Heart*, 104(7):550–557, 2018
20. H. Gao, A. Aderhold, K. Mangion, X. Luo, D. Husmeier, and C. Berry. Changes and classification in myocardial contractile function in the left ventricle following acute myocardial infarction. *Journal of The Royal Society Interface*, 14(132):20170203, 2017
21. H. Gao, L. Feng, N. Qi, B. Griffith, C. Berry, and X. Luo. A coupled mitral valve – left ventricle model with fluid-structure interaction. *Journal of Medical Engineering & Physics*, 2017
22. H. Gao, K. Mangion, D. Carrick, D. Husmeier, X. Luo, and C. Berry. Estimating myocardial contractility in acute mi survivors with left ventricular dysfunction from personalised computational heart models. *Scientific Report*, Accepted, 2017
23. L. Cai, Y. Wang, H. c. a. Gao, Y. Li, and X. Luo. A mathematical model for active contraction in healthy and failing myocytes and left ventricles. *PLoS ONE*, 12(4):e0174834, 2017
24. H. Gao, N. Qi, L. Feng, X. Ma, M. Danton, C. Berry, and X. Luo. Modelling mitral valvular dynamics–current trend and future directions. *International Journal for Numerical Methods in Biomedical Engineering*, 2016
25. A. Van Hirtum, B. Wu, H. Gao, and X. Luo. Constricted channel flow with different cross-section shapes. *European Journal of Mechanics-B/Fluids*, 63:1–8, 2017
26. K. Mangion, H. Gao, C. McComb, D. Carrick, G. Clerfond, X. Zhong, X. Luo, C. Haig, and C. Berry. A novel method for estimating myocardial strain: Assessment of deformation tracking against reference magnetic resonance methods in healthy volunteers. *Scientific Reports*, 6, 2016

27. W. Chen, H. Gao, X. Luo, and N. Hill. Study of cardiovascular function using a coupled left ventricle and systemic circulation model. *Journal of biomechanics*, 49(12):2445–2454, 2016

28. S. Land, V. Gurev, S. Arens, C. M. Augustin, L. Baron, R. Blake, C. Bradley, S. Castro, A. Crozier, M. Favino, et al. Verification of cardiac mechanics software: benchmark problems and solutions for testing active and passive material behaviour. 471(2184):20150641, 2015

29. N. Qi, H. Gao, R. W. Ogden, N. A. Hill, G. A. Holzapfel, H.-C. Han, and X. Luo. Investigation of the optimal collagen fibre orientation in human iliac arteries. *Journal of the mechanical behavior of biomedical materials*, 52:108–119, 2015

30. H. Gao, C. Berry, and X. Luo. Image-derived human left ventricular modelling with fluid-structure interaction. pages 321–329, 2015

31. H. Gao, N. Qi, X. Ma, B. E. Griffith, C. Berry, and X. Luo. Fluid-structure interaction model of human mitral valve within left ventricle. pages 330–337, 2015

32. H. Gao, X. Ma, N. Qi, C. Berry, B. Griffith, and X. Luo. A finite strain nonlinear human mitral valve model with fluid-structure interaction. *International journal for numerical methods in biomedical engineering*, 30:1597–1613, 2014

33. H. Gao, W. Li, L. Cai, C. Berry, and X. Luo. Parameter estimation in a holzapfel–ogden law for healthy myocardium. *Journal of engineering mathematics*, 95(1):231–248, 2015

34. L. Cai, H. Gao, X. Luo, and Y. Nie. Multi-scale modelling of the human left ventricle. *Scientia Sinica Physica, Mechanica & Astronomica*, 45:024702, 2015

35. H. Gao, D. Carrick, C. Berry, B. Griffith, and X. Luo. Dynamic finite-strain modelling of the human left ventricle in health and disease using an immersed boundary-finite element method. *IMA Journal of Applied Mathematics*, 79:978–1010, 2014

36. H. Gao, H. Wang, C. Berry, X. Luo, and B. E. Griffith. Quasi-static image-based immersed boundary-finite element model of left ventricle under diastolic loading. *International journal for numerical methods in biomedical engineering*, 30:1199–1222, 2014

37. H. Gao, A. Allan, C. McComb, X. Luo, and C. Berry. Left ventricular strain and its pattern estimated from cine cmr and validation with dense. *Physics in medicine and biology*, 59(13):3637, 2014

38. H. Wang, X. Luo, H. Gao, R. Ogden, B. Griffith, C. Berry, and T. Wang. A modified holzapfel-ogden law for a residually stressed finite strain model of the human left ventricle in diastole. *Biomechanics and modeling in mechanobiology*, 13(1):99–113, 2014

39. L. Saba, H. Gao, E. Raz, S. V. Sree, L. Mannelli, N. Tallapally, F. Molinari, P. P. Bassareo, U. R. Acharya, H. Poppert, et al. Semiautomated analysis of carotid artery wall thickness in mri. *Journal of Magnetic Resonance Imaging*, 39(6):1457–1467, 2014

40. Y. Zhu, X. Luo, H. Gao, C. McComb, and C. Berry. A numerical study of a heart phantom model. *International Journal of Computer Mathematics*, (ahead-of-print):1–17, 2014

41. H. Gao, B. E. Griffith, D. Carrick, C. McComb, C. Berry, and X. Luo. Initial experience with a dynamic imaging-derived immersed boundary model of human left ventricle. In *Functional Imaging and Modeling of the Heart*, pages 11–18. Springer Berlin Heidelberg, 2013

42. H. Wang, H. Gao, X. Luo, C. Berry, B. Griffith, R. Ogden, and T. Wang. Structure-based finite strain modelling of the human left ventricle in diastole. *International journal for numerical methods in biomedical engineering*, 29(1):83–103, 2013

43. X. Ma, H. Gao, B. E. Griffith, C. Berry, and X. Luo. Image-based fluid–structure interaction model of the human mitral valve. *Computers & Fluids*, 71:417–425, 2013

44. H. Gao, K. Kadir, A. R. Payne, J. Soraghan, C. Berry, et al. Highly automatic quantification of myocardial oedema in patients with acute myocardial infarction using bright blood t2-weighted cmr. *Journal of Cardiovascular Magnetic Resonance*, 15(1):28, 2013

45. L. Saba, N. Tallapally, H. Gao, F. Molinari, M. Anzidei, M. Piga, R. Sanfilippo, and J. S. Suri. Semiautomated and automated algorithms for analysis of the carotid artery wall on computed tomography and sonography a correlation study. *Journal of Ultrasound in Medicine*, 32(4):665–674, 2013

46. U. Acharya, S. V. Sree, M. Mookiah, L. Saba, H. Gao, G. Mallarini, and J. Suri. Computed tomography carotid wall plaque characterization using a combination of discrete wavelet transform and texture features: A pilot study. *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine*, 227(6):643–654, 2013

47. K. Kadir, H. Gao, A. Payne, J. Soraghan, and C. Berry. Lv wall segmentation using the variational level set method (lsm) with additional shape constraint for oedema quantification. *Physics in medicine and biology*, 57(19):6007, 2012

48. L. Saba, H. Gao, U. R. Acharya, S. Sannia, G. Ledda, and J. S. Suri. Analysis of carotid artery plaque and wall boundaries on ct images by using a semi-automatic method based on level set model. *Neuroradiology*, 54(11):1207–1214, 2012

49. H. Gao, Q. Long, S. K. Das, U. Sadat, M. Graves, J. H. Gillard, and Z.-Y. Li. Stress analysis of carotid atheroma in transient ischemic attack patients: evidence for extreme stress-induced plaque rupture. *Annals of biomedical engineering*, 39(8):2203–2212, 2011

50. H. Gao, Q. Long, S. Kumar Das, J. Halls, M. Graves, J. H. Gillard, and Z.-Y. Li. Study of carotid arterial plaque stress for symptomatic and asymptomatic patients. *Journal of biomechanics*, 44(14):2551–2557, 2011

51. H. Gao, Q. Long, M. Graves, J. H. Gillard, and Z.-Y. Li. Carotid arterial plaque stress analysis using fluid–structure interactive simulation based on in-vivo magnetic resonance images of four patients. *Journal of biomechanics*, 42(10):1416–1423, 2009

52. H. Gao, Q. Long, M. Graves, J. H. Gillard, and Z.-Y. Li. Study of reproducibility of human arterial plaque reconstruction and its effects on stress analysis based on multispectral in vivo magnetic resonance imaging. *Journal of Magnetic resonance imaging*, 30(1):85–93, 2009

53. H. Gao, Q. Long, U. Sadat, M. Graves, J. Gillard, and Z. Li. Stress analysis of carotid atheroma in a transient ischaemic attack patient using the mri-based fluid–structure interaction method. *The British Journal of Radiology*, 82:46–54, 2009

54. H. Gao and Q. Long. Effects of varied lipid core volume and fibrous cap thickness on stress distribution in carotid arterial plaques. *Journal of biomechanics*, 41(14):3053–3059, 2008

55. G. Zhao, H. Gao, J. Wu, S.-x. Xu, M. Collins, Q. Long, C. König, and A. Padhani. 2d numerical simulation of effect anti-angiogenic factors angiostatin and endostatin on tumor-induced angiogenesis. *J. Med. Biomech*, 21(4):272–279, 2006

56. H. Gao, S. Xu, Y. Cai, and M. Collins. Numerical simulation of tumor-induced angiogenesis in and out of tumor incorporating mechanical effects. *J. Med. Biomech*, 21:1–7, 2006

57. H. Gao, S. Xu, Y. Cai, M. Collins, y. Jiang, and J. Wang. Computation of hemodynamics in solid tumor based on the model of angiogenesis. *Chinese Quarterly of Mechanics*, 27(3):449–453, 2006

58. H. Gao, S. Xu, Y. Cai, and M. Collins. Two dimensional mathematical models of tumor-induced angiogenesis. *Chinese Quarterly of Mechanics*, 26(3):468–471, 2005

59. Y. Cai, Y. Liu, H. Gao, Y. Jiang, G. Wu, and S. Xu. Predicted mathematical model of intracranial pressure through lumbar cerebrospinal fluid pressure. *Chinese Quarterly of Mechanics*, 4:029, 2005

60. Y. Cai, S. Xu, y. Jiang, and H. Gao. Blood flow in a coronary capillary considering influence of vessel nonlinear length chang and inflitration. *Chinese Quarterly of Mechanics*, 26(2):241–247, 2005

61. Y. Cai, Y. Liu, H. Gao, and et al. Numerical simulation of cerebral hemodynamics and intracranial pressure dynamics. *Chinese Quarterly of Mechanics*, 26(3):455–458, 2005
62. Y. Liu, G. Wu, F. Yuan, Y. Jiang, H. Gao, and S. Xu. Pulse pressure and mean pressure relationship of intracranial pressure and lumbar cerebrospinal fluid pressure. *J. Biomed. Eng. China*, 22(4):704–707, 2005
63. H. Gao, G. Wu, Y. Liu, F. Yuan, Y. Jiang, and S. Xu. Analysis of the low frequency components of the intracranial pressure. *Journal of Shanghai Biomedical Engineering*, 24(3):10–14, 2003

Under preparation

1. Richardson S., Gao, H. and others, Griffith B., Luo XY., Myocardial perfusion modelling using immersed boundary methods
2. Mortensen P., Gao H., Smith G., Simitev R. Action potential propagation in a myocyte-fibroblast model of myocardium
3. Planned paper 1: personalized MI modelling with LGE mapping
4. Planned paper 2: coupled EP and Mechanics in left ventricle
5. Planned paper 3: Personalized biventricular models
6. Planned paper 4: MV mechanics with Dr. Joyce Ma, University of Chongqing, China

Book chapters and PhD thesis

1. H. Gao and Q. Long. Carotid plaque stress analysis: Issues on patient-specific modeling. In *Multi-Modality Atherosclerosis Imaging and Diagnosis*, pages 95–106. Springer New York, 2014
2. H. Gao and Q. Long. Atherosclerosis plaque stress analysis: A review. In *Multi-Modality Atherosclerosis Imaging and Diagnosis*, pages 81–93. Springer New York, 2014
3. H. Gao and Q. Long. Stress analysis on carotid atherosclerotic plaques by fluid structure interaction. In *Atherosclerosis Disease Management*, pages 87–118. Springer, 2011
4. H. Gao. Carotid plaque stress analysis by fluid structure interaction based on in-vivo mri: Implications to plaque vulnerability assessment. 2010

Referred conference abstracts

1. D. Guan, J. Yao, X. Luo, and H. Gao. Effects of myofibre architecture on biventricular biomechanics: a simulation study. In *Proceedings of 6th International Conference on Computational and Mathematical Biomedical Engineering*, Sendai, Japan 10-12 June 2019
2. D. Husmeier, A. Lazarus, U. Noe, A. Borowska, B. Macdonald, H. Gao, C. Berry, and X. Luo. Statistical emulation of cardiac mechanics: an important step towards a clinical decision support system. In *International Conference on Theoretical and Applied Nanoscience and Nanotechnology (ICSTA'19)*, Lisbon, Portugal 2019
3. L. Romaszko, A. Borowska, A. Lazarus, H. Gao, X. Luo, and D. Husmeier. Direct learning left ventricular meshes from cmr images. In *Proceedings of the Internationla Conference on Statistics: Theory and Application*, Lisbon, Portugal – August 13-14, 2019
4. L. Romaszko, A. Lazarus, H. Gao, A. Borowska, X. Luo, and D. Husmeier. Massive dimensionality reduction for the left ventricular mesh. In *Proceedings of the Internationla Conference on Statistics: Theory and Application*, Lisbon, Portugal – August 13-14, 2019

5. Y. Yang, H. Gao, C. Berry, A. Radjenovic, and D. Husmeier. Quantification of myocardial perfusion lesions using spatially variant finite mixture modelling of dec-mri. In *Proceedings of the Internationla Conference on Statistics: Theory and Application*, Lisbon, Portugal – August 13-14, 2019

6. H. Gao, K. Magnion, C. Berry, and X. Luo. Mathematical modelling acute myocardial infarction based on magnetic resonance imaging. In *BAMC, University of St Andrews*, 26th - 29th March 2018

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8. A. Lazarus, H. Gao, W. Li, X. Luo, and D. Husmeier. Investigating left ventricular geometries from diseased patients and healthy volunteers. In *BAMC, University of St Andrews*, 26th - 29th March 2018

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Supervised PhD Students

- **David, Dalton** (2019 – 2022) Statistical inference and emulation in cardiac mechanics, co-supervisor
- **Yingjie Wang** (2019 – 2022) Mathematical modelling cardiac perfusion after myocardial infarction, co-supervisor
- **Debao Guan** (2017 – 2021) Mathematical modelling of Growth and remodeling in healthy and diseased heart, leading supervisor, funded by Fee-Waiver from University of Glasgow and Chinese CSC scholarship
- **Yalei Yang** (2018 - 2021) Statistical modelling of cardiac perfusion imaging, co-supervisor, co-funded by GSK and University of Glasgow

- **Alan Lazarus** (2017 - 2020) Statistical emulation of biomechanical cardiac models, co-supervisor, co-funded by GSK and University of Glasgow

Supervised MSC Students

- **Fisal Asiri** (04.2017 – 09.2017), Mathematical modeling of human cardiac myocyte active contraction. School of Mathematics and Statistics, University of Glasgow.
- **Aiyashi Mohammed** (01.2018 – 10.2019) Integrated PhD in Applied Mathematics and transfered to MSc, University of Glasgow
- **Huang YL** (06.2016 – 09.2016) Multivariate adaptive regression splines based emulation of the heart kinematics. School of Mathematics and Statistics, University of Glasgow.
- **Tsafos YD** ((06.2016 – 09.2016)) Gaussian Process Based Emulator of the Heart Kinematics. School of Mathematics and Statistics, University of Glasgow.

Track Record

Dr. Hao Gao is a lecturer and a key member of SofTMech, CI in SofTMech–MP, whose primary research interest lies in mathematical modelling of the cardiovascular system, in particular in multi-physics/-scale personalized biomechanical models through closely working with clinicians, with an aim of translating advanced mathematical models into clinics. He has been developing biomechanical models of arterial wall, heart, mitral valves and their interactions by incorporating clinical in/ex vivo measurements for more than 10 years, and has published over 60 peer-reviewed journal papers and book chapters (1072 Google scholar citations, H-index of 19, i10-index of 26).

Biography

Dr. Hao Gao is a lecturer in applied mathematics at School of Mathematics and Statistics, University of Glasgow. He obtained his bachelor and master degree in applied mechanics from Fudan Univeristy, and then pursued his PhD in computational biomechanics at Brunel University. After finishing his PhD, Dr. Gao spent one year in University of Strathclyde on cardiac magnetic resonance imaging process, then moved to University of Glasgow as a research fellow working on image-based cardiac function modelling, first on mitral valve, now focusing on ventricle. Dr. Gao is a key member of the SofTMech centre funded by UK EPSRC at University of Glasgow.