Weiguang Yang

Department of Mechanical Engineering
University of Texas, Rio Grande Valley

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Academic Employment

Research Associate, Department of Pediatrics, Stanford University Jan 2013 – Jul 2024
Lecturer, Department of Mechanical Engineering, Santa Clara University Apr 2024 – Jun 2024
Assistant Professor, Department of Mechanical Engineering, University of Texas, Rio Grande Valley Sep 2024 – present

EDUCATION

BS, Mechanics and Engineering Science, Peking University, Beijing, China, 2007.

MS, Mechanical and Aerospace Engineering, University of California, San Diego, La Jolla, CA, 2010.

PhD, Mechanical and Aerospace Engineering, University of California, San Diego, La Jolla, CA, 2012.

EXPERIENCE

Research Assistant, Department of Mechanical and Aerospace Engineering, UC San Diego.
Projects:
1. Surgical Design and Optimization for the Fontan Procedure Using Computational Fluid Dynamics and Derivative-Free Optimization.
2. Hemodynamic Optimization Design for Cardiovascular Stents.

Visiting Student, GERAD(Group for Research in Decision Analysis), Polytechnique Montreal.
Project: Evaluating Mesh Adaptive Direct Search with a Bayesian Treed Gaussian Process Model Using Cardiovascular Design Problems.

Research Associate, Department of Pediatrics, Stanford University.
Projects:
1. Treatment Planning for Peripheral Pulmonary Artery Stenosis in Children with Alagille and Williams Syndromes.
2. Computational Modeling and Risk Stratification for Pulmonary Arterial Hypertension
3. Passive Optimization Design for a Novel Impeller Pump for Patients with Single Ventricle Defects.
4. Evaluating Hemodynamic Performance of Pacing Leads with a Slippery Coating.
5. Modeling and Optimization of a Wearable Hydraulic Shock Absorber.

Engineering Consultant, Inquis Medical, Inc.
Project: Evaluating Catheter Designs for Aspiration Thrombectomy.

TEACHING

Teaching Assistant, Department of Mechanical and Aerospace Engineering, University of California San Diego, MAE 104 Aerodynamics, Fall Quarter, 2007.

Teaching Assistant, Department of Mechanical and Aerospace Engineering, University of California San Diego, MAE 261 Cardiovascular Fluid Mechanics, Spring Quarter 2009.

Teaching Assistant, Department of Mechanical and Aerospace Engineering, University of California San Diego, MAE 101 Introduction to fluid mechanics, Winter Quarter 2010.

Guest Lecturer, Department of Bioengineering, Stanford University, BIOE/CME/ME 285 Computational Modeling in the Cardiovascular System, Winter Quarter 2023.

Instructor, Department of Mechanical Engineering, Santa Clara University, MECH 130 Mathematical Methods in Mechanical Engineering, Spring Quarter 2024.

Instructor, Department of Mechanical Engineering, University of Texas, Rio Grande Valley, BMEE 6322 Cardiovascular Biomechanics, Fall Semester 2024.

Instructor, Department of Mechanical Engineering, University of Texas, Rio Grande Valley, MECE 2335 Thermodynamics, Spring Semester 2025.

HONORS AND AWARDS

Kaplan Dissertation Fellowship, University of California, San Diego, 2011-2012

PEER REVIEWED PUBLICATIONS

31 Choi, K., **Yang, W.**, Pak, O. S., Seo, J., "Hemodynamics of slip surfaces for thrombosis control in implanted cardiovascular devices", ***Physics of Fluids***, 37(2), 021907, (2025). doi: 10.1063/5.0250947

30 Cecchi, N. J., Liu, Y., Vegesna, R. V., Zhan, X., **Yang, W.**, Espinoza-Campomanes, L. A., Grant, G. A. and Camarillo, D. B., "A wearable hydraulic shock absorber with efficient energy dissipation", ***Int J Mech Sci.***, 109097, (2024). https://doi.org/10.1016/j.ijmecsci.2024.109097

29 Szafron, J. M., **Yang, W.**, Feinstein, J. A., Rabinovitch, M. and Marsden, A. L., "A computational growth and remodeling framework for adaptive and maladaptive pulmonary arterial hemodynamics", ***Biomech Model Mechanobiol.***, 22(6), 1935–1951, (2023). doi: 10.1007/s10237-023-01744-z.

28 **Yang, W.**, Conover, T. A., Figliola, R. S., Giridharan, G. A., Marsden, A. L. and Rodefeld, M. D., "Passive performance evaluation and validation of a viscous impeller pump for subpulmonary Fontan circulatory support", ***Scientific Reports***, 13, (2023). doi: 10.1038/s41598-023-38559-y.

27 Tran, Kaladji, A., **Yang, W.**, Marsden, A. L. and Lee, J. T., "Assessing differences in aortic haemodynamics between two- versus four-vessel fenestrated endovascular aneurysm repair using patient-specific computational flow simulation", ***Eur J Vasc Endovasc Surg.***, Online Ahead of Print, (2023). doi: 10.1016/j.ejvs.2023.07.050.

26 Lan, I. S., Liu, J., **Yang, W.** and Marsden, A. L., "Numerical investigation of abdominal aortic aneurysm hemodynamics using the reduced unified continuum formulation for vascular fluid-interaction-structure", ***Forces in Mechanics***, 7, (2022). https://doi.org/10.1016/j.finmec.2022.100089

25 Lan, I. S., Liu, J., **Yang, W.** and Marsden, A. L., "A reduced unified continuum formulation for vascular fluid-structure interaction: formulation, solution method, verification, and applications", ***Comput. Meth. Appl. Mech. Engrg.***, 394, (2022). https://doi.org/10.1016/j.cma.2022.114852

24 Pfaller, M. R., Pham, J., Verma, A., Pegolotti, L., Wilson, N. M., Parker, D. W., **Yang, W.**, Marsden, A. L., "Automated generation of 0D and 1D reduced-order models of patient-specific blood flow", ***Int J Numer Meth Biomed Engng.***, 38, e3639, (2022). https://doi.org/10.1002/cnm.3639

23 Lan, I. S, Liu, J., **Yang, W.**, Zimmermann, J., Ennis, D. B. and Marsden, A. L., "Validation of the reduced unified continuum formulation against in vitro 4D-Flow MRI", ***Ann Biomed Eng.***, (2022). https://doi.org/10.1007/s10439-022-03038-4

22 Lan, I. S., **Yang, W.**, Feinstein, J. A., Kreutzer, J., Collins II, R. T., Ma, M., Adamson, G. T. and Marsden, A. L., "Virtual treatment planning in Williams and Alagille patients with peripheral pulmonary artery stenosis", ***J Am Heart Assoc.***, 11, e023532, (2022). https://doi.org/10.1161/JAHA.121.023532

21 Dong, M. L., Lan, I. S., **Yang, W.**, Rabinovitch, M., Feinstein, J. A. and Marsden, A. L., "Computational simulation-derived hemodynamic and biomechanical properties of the pulmonary arterial tree early in the course of ventricular septal defects", ***Biomech Model Mechanobiol.***, 20, pp. 2471–2489, (2021). https://doi.org/10.1007/s10237-021-01519-4

20 Stromberg, D., Carvalho, K., Marsden, A. L., Mery, C. M., Immanuel, C., Mizrahi, M. and **Yang, W.**, "Standard CPR versus interposed abdominal compression CPR in shunted single ventricle patients: comparison using a lumped parameter mathematical model", ***Cardiology in the Young***, 1–7, (2021). https://doi.org/10.1017/S1047951121003917

19 Tran, K., **Yang, W.**, Marsden, A. L. and Lee, J. T., "Patient-specific computational flow modelling for assessing hemodynamic changes following fenestrated endovascular aneurysm repair", ***JVS-Vascular Science***, 2, pp. 53–69, (2021).

18 Liu, J., **Yang, W.**, Dong, M. L. and Marsden, A. L., "The nested block preconditioning technique for the incompressible Navier–Stokes equations with emphasis on hemodynamic simulations", ***Comput. Meth. Appl. Mech. Engrg.***, 367, 113122, (2020).

17 Dong, M. L., **Yang, W.**, Tamaresis, J. S., Chan, F. P., Zucker, E. J., Kumar, S., Rabinovitch, M., Marsden, A. L., Feinstein, J. A., "Image-based scaling laws for somatic growth and pulmonary artery morphometry from infant to adulthood", ***Am J Physiol Heart Circ Physiol***, 319(2), H432–H442, (2020).

16 Liu, J., **Yang, W.**, Lan, I. S. and Marsden, A. L., "Fluid-structure interaction modeling of blood flow in the pulmonary arteries using the unified continuum and variational multiscale formulation", ***Mech Res Commun***, 107, 103556, (2020).

15 Contijoch, F., Li, B., **Yang, W.**, Silva-Sepulveda, J. A., Vodkin, I., Printz, B., Vavinskaya, V., Hegde, S., Marsden, A., El-Sabrout, H., Alshawabkeh, L., Moore, W. J. and El-Said, H., "Exercise MRI highlights heterogeneity in cardiovascular mechanics among patients with Fontan circulation: proposed protocol for routine evaluation", ***J Thorac Dis***, 3(2), (2019).

14 **Yang, W.**, Dong, M., Rabinovitch, M., Chan, F. P., Marsden, A. L. and Feinstein, J. A., "Evolution of hemodynamic forces in the pulmonary tree with progressively worsening pulmonary arterial hypertension in pediatric patients", ***Biomech Model Mechanobiol.***, 18, pp. 779–796, (2019).

13 **Yang, W.**, Marsden, A. L., Ogawa, M. T., Sakarovitch, C., Hall, K. K., Rabinovitch, M. and Feinstein, J. A., "Right ventricular stroke work correlates with outcomes in pediatric pulmonary arterial hypertension", ***Pulmonary Circulation***, 8(3), pp. 1–9, (2018).

12 **Yang, W.**, Hanley, F. L., Chan, F. P., Marsden, A. L., Vignon-Clementel, I. E. and Feinstein, J. A., "Computational simulation of postoperative pulmonary flow distribution in Alagille patients with peripheral pulmonary artery stenosis", ***Congenital Heart Disease***, 13(2), pp. 241–250, (2017).

11 Siehr, S. L., Feinstein, J. A., **Yang, W.**, Peng, L. F., Ogawa, M. T. and Ramamoorthy, C., "Hemodynamic effects of phenylephrine, vasopressin, and epinephrine in children with pulmonary hypertension: a pilot study", ***Pediatr Crit Care Med***, 17(5), pp. 428–437, (2016).

10 Nakayama, K. H., Surya, V. V., Gole M., Walker, T., **Yang, W.**, Lai, E., Ostrowski, M., Gerald G., Fuller, A. D. and Huang, N. F., "Nanoscale patterning of extracellular matrix alters endothelial function under shear stress", ***Nano Lett.***, 16(1), pp. 410–419, (2016).

9 **Yang, W.**, Feinstein, J. A. and Vignon-Clementel, I. E., "Adaptive outflow boundary conditions improve post-operative predictions after repair of peripheral pulmonary artery stenosis", ***Biomech Model Mechanobiol.***, 15, pp. 593–627, (2016).

8 Martin, M. H., Feinstein, J. A., Chan, F. P., Marsden, A. L., **Yang, W.** and Reddy, V. M., "Technical feasibility and intermediate outcomes of a hand-crafted, area-preserving, bifurcated Y-graft Fontan", ***J Thorac Cardiovasc Surg.***, 149, pp. 239–245, (2014).

7 **Yang, W.**, Chan, F. P., Reddy, V. M., Marsden, A. L. and Feinstein, J. A., "Flow simulations and validation for the first cohort of patients undergoing the Y-graft Fontan procedure", ***J Thorac Cardiovasc Surg.***, 149, pp. 247–255, (2014).

6 **Yang, W.**, Feinstein, J. A., Shadden, S. C., Vignon-Clementel, I. E. and Marsden, A. L., "Optimization of a Y-graft design for improved hepatic flow distribution in the Fontan circulation", ***J Biomech Eng.***, 135(1), 011002, (2013).

5 Gundert, T. J., Marsden, A. L., **Yang, W.**, Marks, D. S. and LaDisa Jr., J. F., "Identification of hemodynamically optimal coronary stent designs based on vessel caliber", ***IEEE Trans Biomed Eng.***, 59(7), pp. 1992–2002, (2012).

4 Gundert, T. J., Marsden, A. L., **Yang, W.** and LaDisa Jr., J. F., "Optimization of cardiovascular stent design using computational fluid dynamics", ***J Biomech Eng.***, 134(1), 011002, (2012).

3 **Yang, W.**, Vignon-Clementel, I. E., Troianowski, G., Reddy, V. M., Feinstein, J. A. and Marsden, A. L., "Hepatic blood flow distribution and performance in traditional and Y-graft Fontan geometries: a case series computational fluid dynamics study", ***J Thorac Cardiovasc Surg.***, 143, pp. 1086–1097, (2012).

2 Baretta, A., Corsini, C., **Yang, W.**, Vignon-Clementel, I. E., Marsden, A. L., Feinstein, J. A., Hsia, T.-Y., Dubini, G., Migliavacca, F. and Pennati, G., "Virtual surgeries in patients with congenital heart disease: a multiscale modelling test case", ***Phil Trans R Soc A***, 369(1954), pp. 4316–4330, (2011).

1 **Yang, W.**, Feinstein, J. A. and Marsden, A. L., "Constrained optimization of an idealized Y-shaped baffle for the Fontan surgery at rest and exercise", ***Comput Meth Appl Mech Engrg***, 199(33–36), pp. 2135–2149, (2010).

BOOK CHAPTERS

1. **Yang, W.**, Feinstein, J. A. and Marsden, A. L., "Computational Modeling and Personalized Surgery", *3-Dimensional Modeling in Cardiovascular Disease,* edited by Zahn, E. M., Elsevier, pp. 155-175, (2020).

2. **Yang, W.**, Feinstein, J. A. and Vignon-Clementel, I. E., "Modeling the Pulmonary Circulation in CHD: Clinical Concepts, Engineering Applications, and an Integrated Medico-Engineering Approach", *Modelling Congenital Heart Disease Engineering a Patient-specific Therapy,* edited by Butera, G., Schievano, S., Biglino, G. and McElhinney, D. B., Springer, pp 157–167, (2022)

3. Brown, A., Sexton, Z., Hu, Z., **Yang, W.** and Marsden, A. L., "Computational Approaches for Mechanobiology in Cardiovascular Development and Diseases" *Current Topics in Developmental Biology: Heart Development and Disease* edited by Nicole Dubois, Academic Press, (2024)
https://doi.org/10.1016/bs.ctdb.2024.01.006

CONFERENCE PROCEEDINGS AND ABSTRACTS

1. **Yang, W.**, Feinstein, J. A., Reddy, V. M and Marsden, A. L.,"Optimization of an idealized Y-Shaped extracardiac Fontan Baffle." ***Meeting of the American Physical Society Division of Fluid Dynamics.*** San Antonio, TX, Nov. 2008.

2. **Yang, W.**, Feinstein, J. A., Reddy, V. M and Marsden, A. L., "Optimization Of An Idealized Y-Graft For The Fontan Procedure Using CFD And A Derivative-Free Optimization Algorithm " ***ASME Summer Bioengineering Conference.*** Lake Tahoe, CA, Jun. 2009

3. **Yang, W.**, Feinstein, J. A. and Marsden, A. L., "Analysis of alternative polling strategies for derivative-free optimization of the Fontan Surgery." ***Meeting of the American Physical Society Division of Fluid Dynamics.*** Minneapolis, MN, Nov. 2009.

4. **Yang, W.**, Troianowski, G., Birolleau, A., Vignon-Clementel I. E., Feinstein, J. A. and Marsden, A. L., "Virtual design for the Fontan procedure: from idealized to patient specific models using CFD and derivative-free optimization." ***ASME Summer Bioengineering Conference.*** Naples, FL, Jun. 2010

5. **Yang, W.**, Vignon-Clementel I. E., Troianowski, Shadden,S. C., Reddy, V. M., Feinstein, J. A. and Marsden, A. L., "Quantification of hepatic flow distribution using particle tracking for patient specific virtual Fontan surgery." ***Meeting of the American Physical Society Division of Fluid Dynamics.*** Long Beach, CA, Nov. 2010.

6. **Yang, W.**, Feinstein, J. A., Vignon-Clementel I. E., Shadden,S. C. and Marsden, A. L., "Customization of the Fontan Y-graft: are unequal branches necessary for optimal hepatic flow distribution?" ***ASME Summer Bioengineering Conference.*** Farmington, PA, Jun. 2011

7. **Yang, W.**, Vignon-Clementel, I. E., Troianowski, G., Shadden S. S., Reddy V. M., Feinstein, J. A. and Marsden, A. L., "Fontan surgical design for improved hepatic flow distribution using CFD and derivative-free optimization" ***2nd International Conference on Computational and Mathematical Biomedical Engineering.*** Washington D.C., Apr. 2011

8. **Yang, W.**, Feinstein, J. A., Reddy, V. M., Chan, F. P. and Marsden, A. L., "Comparison of clinical and simulation results for the Stanford Y-graft Fontan pilot study" ***ASME Summer Bioengineering Conference.*** Fajardo, PR, Jun. 2012

9. **Yang, W.**, Chan, F. P., Hanley, F. L. and Feinstein, J. A., "Applying image-based hemodynamic simulations to surgical interventions for peripheral pulmonary artery stenosis (PPAS)" ***7th World Congress of Biomechanics.*** Boston, MA, Jul. 2014

10. **Yang, W.**, Feinstein, J. A., Marsden A. L., Hanley, F. L., Chan, F. P., Faberowski, L. W. and Vignon-Clementel, I. E., " Improved Post-operative flow modeling for complex peripheral pulmonary artery

stenosis" ***Summer Biomechanics, Bioengineering, and Biotransport Conference.*** Snowbird, UT, Jul. 2015

11. **Yang, W.**, Bhatia, S., Obenauf, D., Resse M., Feinstein, J. A. and Pak O. S., "Influence of Slippery Pacemaker Leads on Lead-Induced Venous Occlusion." ***Meeting of the American Physical Society Division of Fluid Dynamics.*** Portland, OR, Nov. 2016.

12. **Yang, W.**, Marsden A. L., Ogawa M. T., Phillips, K. K., Rabinovitch, M. and Feinstein, J. A., "Right Ventricular Stroke Work Correlates With Outcomes in Pediatric Pulmonary Arterial Hypertension (PAH) Patients" ***American Heart Association Scientific Sessions*** New Orleans, LA, Nov. 2016

13. **Yang, W.**, Hanley, F. L., Chan, F. P.,Marsden A. L., Vignon-Clementel I. E. and Feinstein, J. A., "Hemodynamic Simulations and Predictions for Surgical Repair of Peripheral Pulmonary Stenosis" ***5th International Conference on Computational and Mathematical Biomedical Engineering.*** Pittsburgh, PA, Apr. 2017

14. **Yang, W.**, Dong, M., Marsden, A. L. and Feinstein, J. A., "Progression of Hemodynamic Conditions with Increasing Disease Severity in Pediatric Patients with Pulmonary Arterial Hypertension" ***8th World Congress of Biomechanics.*** Dublin, Ireland, Jul. 2018

15. Pfaller, M., Wilson, N. M.,**Yang, W.**, Parker, D. and Marsden, A. L., "Automatic creation of one-dimensional flow models from three-dimensional anatomical geometries" ***Summer Biomechanics, Bioengineering and Biotransport Conference.*** Vail, CO, 2020

16. Lan, I. S, Liu, J., **Yang, W.**, and Marsden, A. L., "The coupled momentum method revisited: formulation, higher-order elements, solver technology, and verification" ***16th U.S. National Congress on Computational Mechanics.*** Chicago, IL, Jul. 2021

STUDENT MENTORING

University of California, San Diego

Christina Ngo, undergraduate student. Research: Blood Flow Simulation for the Y-graft Fontan Procedure, Oct 2011–Dec 2012.

Marko Blatzheim, visiting student. Research: Modeling Pulmonary Artery Flow for a Patient with Tetralogy of Fallot, Sep 2012–Dec 2012.

Stanford University

Sarah Stewart, MD student. Medical Scholar Research Program: Simulation-Based Study of Pacemaker Lead-Induced Venous Occlusion in Pediatric Patients, Jan 2013–Aug 2014.

Melat Birbo, undergraduate student. SURF: Hemodynamic Simulation for Pediatric Patients with Pulmonary Arterial Hypertension, June 2016–Sep 2016.

Melody Dong, PhD student. Research: Hemodynamic Modeling and Characterization of Pulmonary Arterial Hypertension, Sep 2016–present.

Khalid Ahmad, undergraduate student. REU Program: Developing a Mobile Tool for Prediction of Clinical Worsening of PAH, June 2017–Sep 2017.

Ingrid Lan, PhD student. Research: Virtual Treatment Planning in Williams and Alagille Patients, Sep 2017–present.

Celine Escarmant, undergraduate student. CVI Summer Research: Modeling and Surgical Planning for Potts Shunt in Children with PAH, June 2021–present.

Santa Clara University

Sagar Bhatia, graduate student (co-advised with Prof. On Shun Pak). Research: Modeling Pacing Leads with a Slippery Coating.

Dayna Obenauf, undergraduate student (co-advised). Senior Design: In-Vitro Model for Validating Y-Graft Fontan Simulations.

UT Rio Grande Valley

Oscar Rivas, graduate student. Research: Flow Field Dynamics of a Wide-Neck Intracranial Aneurysm with and without a Double-Wall Vascular Stent.

Alejandro Cazares, graduate student. Research:Computational Modeling of Exercise Physiology in Cardiac Rehabilitation

OPEN SOURCE AND OPEN DATA

Contributor and developer for SimVascular open source project (www.simvascular.org). Contributed to solver development and enhancement. Provided advice and guidance for worldwide SimVascular users.

Co-PI, SimVascular Gateway for Educational Users (gateway.simvascular.org). Applied for annual computational allocation from NSF XSEDE (succeeded by ACCESS), coordinated with other PIs and maintained the gateway.

DIVERSITY AND OUTREACH

Beechwood School – Menlo Park, March 2017. Introduced Bernoulli's principle and its applications in cardiology to students in Grades 6–8.

Johns Hopkins University Center for Talented Youth Educational Outreach Workshop at Stanford, April 2017. Designed and delivered a class session introducing cardiac and valve anatomy and their physiological functions.

NSF Outreach Activity via Summer Engineering Seminar, Santa Clara University, July 2024. Organized a session introducing high school students to Mechanical Engineering with hands-on activities, including a non-Newtonian fluid demonstration and a small boat design competition.

RGV Regional Science and Engineering Fair, University of Texas Rio Grande Valley. Interviewed student participants, evaluated projects, selected winners, and led lab tours and open-house demonstrations during Engineering Week.