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Education:

1990	Ph. D., Mathematics	University of Minnesota, Minneapolis, MN
1980	B. S., Mathematics	National Taiwan University, Taiwan, R. O. C.

Employment:

2004-present	Professor, Department of Mathematics, University of Houston (UH)
2000-2004	Associate Professor, Department of Mathematics, UH
1994-2000	Assistant Professor, Department of Mathematics, UH
1990-1994	Visiting Assistant Professor, Department of Mathematics, UH

Research interests:

1. Fictitious domain methods and its applications:
   i. Developing distributed Lagrange multiplier/fictitious domain (DLM/FD) methods for simulating particulate flow in Newtonian and non-Newtonian fluids, including suspensions, sedimentation, liquid-solid fluidized bed, and etc..
   ii. Investigating particle motion via direct numerical simulations by combining DLM/FD, operator splitting and finite element methods; especially on the lateral migration and interaction of neutrally buoyant particles in 2D and 3D.
2. Immersed boundary methods and its applications: Developing immersed boundary methods for simulating the red blood cell motion in microchannels and investigating the dynamics of red blood cells and malaria-infected red blood cells in a microchannel.
3. Computational fluid dynamics, Scientific computing, Numerical analysis.

Selected research support on particulate flows and red blood cell motion:

1. NSF DMS-1418308: Computational Mathematics Grant (the PI is T.-W. Pan, CO-PI is R. Glowinski). Title: Positive definiteness preserving approaches for viscoelastic flow of Oldroyd-B and FENE-CR types: Applications to particulate flow. $234,212, 08/01/2014 - 07/30/2017.
2. NSF DMS-0914788: Computational Mathematics (the PI was T.-W. Pan, Co-PIs were R. Glowinski and R. Hoppe). Title: Computational methods for the suspensions of deformable and rigid particles and their applications to modelling of blood flows. $340,454, 07/15/2009 - 07/30/2014.
3. NSF DMS-0443826: NIGMS (the PI was S. Canic, Co-PIs were R. Glowinski and T.-W. Pan). Title: Collaborative research: Modeling the growth and adhesion of auricular chondrocytes under controlled flow conditions. $740,000, 05/15/2005 - 04/30/2010.

4. NSF DMS-0209066: Computational Mathematics (the PI was R. Glowinski, Co-PIs were T.-W. Pan and E. Dean). Title: Numerical Simulation of Complex Incompressible Viscous Flow in Time Varying Geometries: Applications. $368,802, 07/01/2002 - 06/30/2006.
5. NSF DMS-9973318: Computational Mathematics (the PI was R. Glowinski, Co-PIs were T.-W. Pan, E. Dean and P.M. Pettitt). Title: Computational Methods for the Direct Simulation of Particulate Flow of Newtonian and Non-Newtonian Incompressible Viscous Fluids. $171,000, 08/01/1999 - 07/31/2003.

Selected publications: (There are 125 total publications including 72 refereed journal papers and 21 refereed conference proceedings papers.)

1. R. Glowinski, T.-W. Pan, J. Periaux, A fictitious domain method for Dirichlet problem and applications, *Comp. Meth. Appl. Mech. Eng.* **111** (1994), 283-303.
2. R. Glowinski, T.-W. Pan, and J. Periaux, A fictitious domain method for external incompressible viscous flow modeled by Navier-Stokes equations, *Comp. Meth. Appl. Mech. Eng.* **112** (1994), 133-148
3. R. Glowinski, T.-W. Pan, J. Periaux, A Lagrange multiplier/fictitious domain method for the Dirichlet problem. Generalization to some flow problems, *Japan J. Indust. Appl. Math.* **12** (1995), 87-108.
4. J. Feng, D.D. Joseph, R. Glowinski, T.-W. Pan, A three-dimensional computation on the force and moment on an ellipsoid settling slowly through a viscoelastic fluid, *J. Fluid Mech.* **283** (1995), 1-16.
5. R. Glowinski, T.-W. Pan, R. O. Wells, X. Zhou, Wavelet and finite element solutions for the Neumann problem using fictitious domains, J. Comput. Phys. **126** (1996), 40-51.
6. R. Glowinski, T.-W. Pan, J. Periaux, A Lagrange multiplier/fictitious domain method for the numerical simulation of incompressible viscous flow around moving rigid bodies (I): The case where the rigid body motions are known a priori, C. R. Acad. Sci. Paris, Serie I **324** (1997), 361-369.
7. T.-W. Pan, Error Estimates for a Fictitious Domain Method with Lagrange Multiplier Treatment on the Boundary for a Dirichlet Problem, *Japan J. Indust. Appl. Math.* **15** (1998), 75-85.
8. R. Glowinski, T.-W. Pan, T.I. Hesla, D.D. Joseph, A distributed Lagrange multiplier/fictitious domain method for particulate flows, *Int. J. Multiphase Flow* **25** (1999), 755-794.
9. R. Glowinski, T.-W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux, A distributed Lagrange multiplier/fictitious domain method for flows around moving rigid bodies: Application to particulate flow, *Int. J. Numer. Methods Fluids* **30** (1999), 1043-1066.
10. T.-W. Pan, Numerical simulation of the motion of a ball falling in an incompressible viscous fluid, *C. R. Acad. Sci. Paris, Série IIb* **327** (1999), 1035-1038.
11. R. Glowinski, T.-W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux, A distributed Lagrange multiplier/fictitious domain method for the simulation of flows around moving rigid bodies: Application to particulate flow, *Comp. Meth. Appl. Mech. Eng.* **184** (2000), 241-268.
12. P. Singh, D. D. Joseph, T. I. Hesla, R. Glowinski, T.-W. Pan A distributed Lagrange multiplier/fictitious domain method for viscoelastic particulate flows *J. Non-Newtonian*

Fluid Mech. **91** (2000), 165-188.
13. N. A. Patankar, P. Singh, D. D. Joseph, R. Glowinski, T.-W. Pan A new formulation of the distributed Lagrange multiplier/fictitious domain method for particulate flows *Int. J. Multiphase Flow* **26** (2000), 1509-1524.
14. R. Glowinski, T.-W. Pan, T.I. Hesla, D.D. Joseph, J. Periaux, A fictitious domain approach to the direct numerical simulation of incompressible viscous flow past moving rigid bodies: Application to particulate flow, *J. Comput. Phys.* **169** (2001), 363-426.
15. T.-W. Pan, D.D. Joseph, and R. Glowinski, Modeling Rayleigh-Taylor instability of a sedimenting suspension of several thousand circular particles in direct numerical simulation, *J. Fluid Mech.* **434** (2001), 23-37.
16. T.-W. Pan, D.D. Joseph, R. Bai, R. Glowinski, V. Sarin, Fluidization of 1204 spheres: simulation and experiment, *J. Fluid Mech.* **451** (2002), 169-191.
17. T.-W. Pan, R. Glowinski, Direct simulation of the motion of neutrally buoyant circular cylinders in plane Poiseuille flow, *J. Comput. Phys.* **181** (2002), 260-279.
18. T.-W. Pan, R. Glowinski, G.P. Galdi, Direct simulation of the motion of a settling ellipsoid in Newtonian fluid, *J. Comput. Appl. Math.* **149** (2002), 71-82.
19. T.-W. Pan, R. Glowinski, and D.D. Joseph, Simulating the dynamics of fluid-ellipsoid interactions, *Computers & Structures* **83** (2005), 463-478.
20. T.-W. Pan, R. Glowinski, Direct simulation of the motion of neutrally buoyant balls in a three-dimensional Poiseuille flow, *C. R. Mecanique* **333** (2005), 884-895.
21. R. Glowinski, T.-W. Pan, J. Periaux, Numerical simulation of a multi-store separation phenomenon: A fictitious domain approach, *Comp. Meth. Appl. Mech. Eng.* **195** (2006), 5566-5581.
22. T.-W. Pan, R. Glowinski, S.-C. Hou, Direct Numerical Simulation of Pattern Formation in a Rotating Suspension of non-Brownian Settling Particles in a Fully Filled Cylinder, *Computers & Structures* **85** (2007), 955-969.
23. T.-W. Pan, C.-C. Chang, R. Glowinski, On the motion of a neutrally buoyant ellipsoid in a three-dimensional Poiseuille flow, *Comp. Meth. Appl. Mech. Eng.* **197** (2008), 2198-2209.
24. J. Hao, T.-W. Pan, R. Glowinski, D.D. Joseph, A fictitious domain/distributed Lagrange multiplier method for the particulate flow of Oldroyd-B fluids: A positive definiteness preserving approach, *J. Non-Newtonian Fluid Mech.* **156** (2009), 95-111.
25. T. Wang, T.- W. Pan, Z. Xing, R. Glowinski, Numerical simulation of rheology of red blood cell rouleaux in microchannels, *Phys. Rev. E* **79** (2009), 041916.
26. J. Hao, T.-W. Pan, S. Canic, R. Glowinski, D. Rosenstrauch, A fluid-cell interaction and adhesion algorithm for tissue-coating of cardiovascular implants, *Multiscale Model. Simul.* **7** (2009), 1669-1694.
27. T.-W. Pan, L. Shi, R. Glowinski, A DLM/FD/IB method for simulating cell/cell and cell/particle interaction in microchannels, *Chin. Ann. Math.* **31(B)** (2010), 975-990.
28. L. Shi, T.-W. Pan, R. Glowinski, Deformation of a single red blood cells in bounded Poiseuille flows, *Phys. Rev. E* **85** (2012), 016307.
29. L. Shi, T.-W. Pan, R. Glowinski, Numerical simulation of lateral migration of red blood cells in Poiseuille flows, *Int. J. Numer. Methods Fluids* **68** (2012), 1393-1408.
30. S.-D. Chen T.-W. Pan, C.-C. Chang, The Motion of a single and multiple neutrally buoyant elliptical cylinders in plane Poiseuille flow, *Phys. Fluids* **24** (2012), 103302.

31. L. Shi, T.-W. Pan, R. Glowinski, Lateral migration and equilibrium shape and position of a red blood cell in bounded Poiseuille flows, *Phys. Rev. E* **86** (2012), 056308.
32. T.-W. Pan, S.-L. Huang, S.-D. Chen, C.-C. Chu, C.-C. Chang, A numerical study of the motion of a neutrally buoyant cylinder in two dimensional shear flow, *Computers & Fluids* **87** (2013), 56-77.
33. S. Hou, T.-W. Pan, R. Glowinski, Circular band formation for incompressible viscous fluid–rigid particle mixtures in a rotating cylinder, *Phys. Rev. E* **89** (2014), 023013.
34. L. Shi, Y. Yu, T.-W. Pan, R. Glowinski, An oscillating motion of a red blood cell and a neutrally buoyant particle in Poiseuille flow in a narrow channel, *Phys. Fluids* **26** (2014), 041904.
35. L. Shi, T.-W. Pan, R. Glowinski, Three-dimensional simulation of red blood cell motion in Poiseuille flows, *Int. J. Numer. Methods Fluids* **76** (2014), 397-415.
36. S. Zhao, T.-W. Pan, Numerical simulation of red blood cell suspensions behind a moving interface in a capillary, *Numer. Math. Theory Methods Appl.* **7** (2014), 499-511.
37. S.-L. Huang, S.-D. Chen, T.-W. Pan, C.-C. Chang, C.-C. Chu, The motion of a neutrally buoyant particle of an elliptic shape in two dimensional shear flow: a numerical study, *Phys. Fluids* 27 (2015), 083303.
38. C.-M. Shih, C.-F. Kung, C.-C. Chang, T.-W. Pan, Self-organized capacity for energy extraction by clustering particles in two-species suspension flow at small Reynolds numbers, *Appl. Phys. Lett.* **106** (2015), 024102.
39. T.-W. Pan, S. Zhao, X. Niu, R. Glowinski, A DLM/FD/IB method for simulating compound vesicle motion under creeping flow condition *J. Comput. Phys.* 300 (2015), 241-253.
40. X. Niu, T.-W. Pan, R. Glowinski, The dynamics of inextensible capsules in shear flow under the effect of the natural state, *Biomech Model Mechanobiol* 14 (2015), 865-876.
41. X. Niu, L. Shi, T.-W. Pan, R. Glowinski. Numerical simulation of the motion of inextensible capsules in shear flow under the effect of the nature state, *Commun. Comput. Phys.* **18** (2015), 787-807.
42. S.-L. Huang, S.-D. Chen, T.-W. Pan, C.-C. Chang, C.-C. Chu. The motion of a neutrally buoyant particle of an elliptic shape in two dimensional shear flow: a numerical study, *Phys. Fluids* **27** (2015), 083303.
43. L. Shi, S. Canic, A. Quaini, T.-W. Pan. A study of self-propelled elastic cylindrical micro-swimmers using modeling and computation, *J. Comput. Phys.* **314** (2016), 264-286.
44. T.-W. Pan, R. Glowinski. Dynamics of particle sedimentation in viscoelastic fluids: A numerical study on particle chain in two-dimensional narrow channel, *J. Non-Newtonian Fluid Mech.* **244** (2017), 44-56.
45. A. Guo, T.-W. Pan, J. He and R. Glowinski Numerical methods for simulating the motion of porous balls in simple 3D shear flows under creeping conditions, *Comput. Methods Appl. Math.* **17** (2017), 397-412.

Synergistic Activities: Collaborations with R. Glowinski and D. D. Joseph have enabled the development of DLM/FD methods and its applications to various types of problems, especially for particulate flows in Newtonian and non-Newtonian fluids.

MS and undergraduate students: 16 M.S. students and 4 undergraduate students.

Ph.D. students: Jian Hao (co-supervised with R. Glowinski, 2007), Tong Wang (co-supervised with R. Glowinski, 2008), Shih-Di Chen (co-supervised with Chien-Chang Chang at the Institute of Applied Mechanics, National Taiwan University, Taiwan, R.O.C., 2013), Lingling Shi (co-supervised with R. Glowinski, 2013), Yao Yu (2013), Shihai Zhao (2014), Xiting Niu (co-supervised with R. Glowinski, 2014), Shang-Huan Chiu (2017), Aixia Guo (co-supervised with Jiwen He, 2017).