CURRICULUM VITAE

Prof. Dr. Kadir KIRKKOPRU

Personal Information:

Place of Birth: Istanbul, Turkey
Date of Birth: 12 June 1957
Nationality: Turkish
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Field:

Fluid Mechanics, Computational Fluid Dynamics, Fluid Machinery, Heat Transfer, Theoretical Combustion

Education:

BSc : Mechanical Engineering, Istanbul Technical University, **1979**, (8,59/10)
MSc: Mechanical Engineering, Istanbul Technical University, **1981**,(9,45/10)
MSc : Mechanical Engineering, University of Colorado at Boulder, USA, **1986**,(GPA: 4,00/4,00)
PhD : Mechanical Engineering, University of Colorado at Boulder, USA, **1988**,(GPA: 4,00/4,00)

Professional Experience:

1979-81: Engineer, Hydromechanics and Hydraulic Machinery Division , Dept of Mech Engg, ITU, Turkey.

1981-84: Research Assistant, Hydromechanics and Hydraulic Machinery Division , Dept of Mech Engg, ITU, Turkey.

"- Tested centrifugal pumps,submersible pumps and fans.
- Designed pumps and fans.
- Developed a code that employs Empedance Method for determining the natural frequencies of hydraulic systems.
- Carried out special purpose fluid dynamics related industrial experiments.
- Worked as a researcher in the prevention of cavitation induced vibrations in Francis turbine diffuser of Gokcekaya Hydroelectric Power Center.
- Taught in Laboratory courses and Recitation hours of Experimental Hydromechanics course"

1984-85: Teaching Assistant , Dept of Mech Engg, University of Colorado at Boulder, USA.

1985-88: Research Assistant, Dept of Mech Engg, University of Colorado at Boulder, USA.
"Constructed asymptotic solutions that describe the structure of the high speed reaction zone for mole number changing reactions that mimics post shock region of detonation waves."

1988-90: Senior Research Associate, School of Mathematics and Physics, University of East Anglia and Royal Aerospace Establishment, England.
"Developed an inviscid and viscid interactive code for boundary layer-primary vortex interaction for a slender delta wing for BAE"

1990 - 91: Lecturer , Hydromechanics and Hydraulic Machinery Division , Dept of Mech Engg, ITU, Turkey.

1991 : Associate Professor, granted by Higher Education Council , (YÖK Doçenti, Termodinamik Anabilim Dalı)

1992 - 92: Associate Professor, Hydromechanics and Hydraulic Machinery Division , Dept of Mech Engg, ITU, Turkey.

1993 - 95: Research Associate and Visiting Profesor, Program in Applied Mathematics, University of Colorado at Boulder, USA.
"Developed a Navier-Stokes Solver for the Unsteady Flow in Solid Propellant Rocket Motors"

1995 - 98: Associate Professor, Hydromechanics and Hydraulic Machinery Division , Dept of Mech Engg, ITU, Turkey.
1998 - : Professor, Hydromechanics and Hydraulic Machinery Division , Dept of Mech Engg, ITU, Turkey

Administrative Duties :

2001-2004 : Associate Department Head
2004 - 2005 : Department Head
2005- 2008 : University Board (Senate) Member
2005- 2008 : Associate Dean
1998 - 2006 : Co-director of Defense Technology Graduate Program at ITU

Courses taught:

Undergraduate:

Fluid Mechanics

Mechanical Engineering Laboratory

Computational Fluid Mechanics

Fluid Machinery

Senior Design Project

Graduate:
Advanced Fluid Dynamics
Computational Fluid Dynamics (Master's Level)
Engineering Mathematics
Computational Fluid Mechanics (PhD Level)

Publications:

1- "Investigation of Parameters Affecting The Cavitation in Water Jet Pumps", M. Sc. Thesis, Istanbul Technical University, 1981 (in Turkish)

2- "Application of Perturbation Methods to Mathematical Modelling of High-Speed Reaction Zones", *Ph.D. Dissertation*, University of Colorado at Boulder, Colorado, USA, 1988.

3- Kirkkopru, K and Kassoy, D. R. " High Speed Reaction Zone Structure for Variable Mole Chemistry", Western States Section, The Combustion Institute, Tucson, Arizona, USA, 1986.

4- Kirkkopru, K and Kassoy, D. R. "Induction Zone Structure of a High-Speed Deflagration with Variable Mole Chemistry", Physics of Fluids A, 1, 874-880, 1989**. (SCI)**

5- Kirkkopru, K and Kassoy, D. R. "High-Speed Reaction Zone Structure for Variable Mole Chemistry", SIAM J. Appl. Math. Vol. 51, 4, 1090-1118, 1991. **(SCI)**

6- Kirkkopru, K and Riley , N., "Secondary Separation from a Slender Wing", N. Riley ile, J. Engineering. Mathematics ., Vol. 25, 4, 329-352, November 1990. **(SCI)**

7- Kirkkopru, K and Kassoy, D. R. "Dissociation-Recombination Relaxation Behind a Normal Shock", Physics of Fluids A, 3, 2777-2785, 1991. **(SCI)**

8- Kirkkopru, K and Riley , N., "Laminar Flow Secondary Separation on a Slender Wing", AGARD Conference Proceedings 494,Vortex Flow Aerodynamics, July 1991.

9- "Computational Fluid Mechanics", *Graduate Course Notes*, ITU, 1992.

10- Kirkkopru, K, Kassoy, D. R. and Zhao, Q , "Unsteady Vorticity Generation and Evolution in a Model of a Solid Rocket Motor: Sidewall Mass Addition Transients", AIAA paper 95-0603.

11- "Viscous Flows", *Graduate Course Notes*, ITU,1995.

12- Kirkkopru, K, Kassoy, D. R. and Zhao, Q " Unsteady Vorticity Generation and Evolution in a Model of a Solid Rocket Motor:", J. Propulsion and Power, Vol. 12, Iss. 4, 646-654, 1996. **(SCI)**

13- Kirkkopru, K .," Unsteady Vortical Flows in Solid Rocket Motors", The 1st Mechanical Engineering Congress, MAMKON'97, Istanbul, 4-6 Haziran 1997. (in Turkish)

14- Kirkkopru, K , " Computational Investigation of Unsteady Internal Flow in Solid Rocket Motors ", Tübitak DOĞA, Turkish Journal of Engineering and Environmental Sciences, Vol.22, No. 4, 329 –336,1998. **(Eng Index)** (in Turkish)

15- Kirkkopru, K., "Analysis of Oscillatory Flows in Hydraulic and Pneumatic Systems by Impedance Method" 239-249, the 3rd Pump Congress, Istanbul, 24-26 September , 1998. (in Turkish)

16- Kirkkopru, K., Aslan , A. R. and Ozdemir, I. B." Defence Technology Graduate Program at ITU and its Contributions to Defense Industry , 2000 li Yıllarde Uzay, Symposium on Aerospace and Defense, Turkish Air Force Academy, Istanbul, 29-30 April, 1999. (in Turkish)

17- Birkan, M.A., Sarioglu, K. and Kirkkopru, K. , "Effects of Droplet Interactions on Vaporization of n-Heptane Fuel Droplet at Sub- and Supercritical Conditions", 15 May 1999, Technical Report for US Air Force.

18- Staab, P.L. , Zhao, Q., Kassoy, D.R. and Kirkkopru, K. " Co-existing Acoustic-Rotational Flow in a Cylinder with Axisymmetric Sidewall Mass Addition" , Physics of Fluids A, V 11, No 10, 2935-2951, 1999. **(SCI)**

19- Kirkkopru, K. and Aslan, A. R. "Defence Technology Graduate Program at ITU", 2000 li Yılların Piyadesi Sempozyumu, Piyade Okul Komutanlığı, Tuzla, İstanbul, 16-17 Kasım 1999

20- Staab, P.L. , Zhao, Q., Kassoy, D. R. and Kirkkopru, K. , "Acoustically Generated Vorticity in an Internal Flow", Journal of Fluid Mechanics, 413, 247-285, 2000 **(SCI)**

21- Kirkkopru, K, Zhao, Q., Kassoy, D.R. and Staab, P.L., " Acoustically Generated Unsteady Vorticity Field in a Long Narrow Cylinder with Sidewall Injection", J. of Engineering Mathematics, V42, 65-90, 2002. **(SCI)**

22- Sen, B.A. , Yuksel, U.G. and Kirkkopru, K., "Comparison of Turbulence Models for an Internal Flow with Sidewall Mass Injection", Int. Symposium on Energy Conversion Fundamentals, Istanbul, 21-25 June 2004.

23 - Uygun, M. and Kirkkopru, K. "Numerical Solution of the Euler Equations by Finite

Volume Methods:Central versus Upwind Schemes," Journal of Aeronautics and Space Technologies, Vol. 2, No. 1, pp.47-55, January 2005.

24- Yuksel, U.G., Sen, B.A. and Kirkkopru, K. "Computation of Flow inside a Channel with Sidewall Mass Injection Using Various Turbulence Models", The 4th International Conference on Computational Heat and Mass Transfer, icchmt'05 ", Paris-Cachan, France, 17-20 May 2005.

25- Uygun, M. and Kirkkopru, K. "Cell-Centered Finite Volume Solution of The Two-

Dimensional Navier-Stokes Equations," Journal of Aeronautics and Space Technologies, Vol.2, No. 2, pp.27-36, July 2005.

26- Uygun, M. and Kirkkopru, K., " Computation of Steady State Low Mach Number Flows with Local Pre-Conditioning", Ankara International Aerospace Conference-AIAC 2005, Ankara-Turkey, August 22-25, 2005,

27- Uygun, M. and Kirkkopru, K., "Computation of Low Mach Number Flows with Local Pre-Conditioning," AED2006-5th International Conference on Advanced Engineering Design, Prague, Czech Republic, 11-14 June 2006.

28- Uygun, M. and Kirkkopru, K. "Numerical Solution of 2-D Euler Equations with Multigrid," , Journal of Aeronautics and Space Technologies, Vol. 3, No. 1, pp.1-9,January 2007.

29- Uygun, M. and Kirkkopru, K. "Computation of Time-Accurate Laminar Flows Using Dual Time Stepping and Local Preconditioning with Multigrid",Tübitak DOĞA, Turkish J. Eng. Env. Sci., **31**, (2007), 211-223. **(Eng Index)**

30 -Uygun, M. and Kirkkopru, K. "Katı yakıtlı Roket Motorlarında Daimi Olmayan Akışların İkili Zaman Adımlaması Yöntemi ile Sayısal Benzetimi" İTÜ Dergisi/d: Mühendislik , Cilt 8, Sayı 2(2009),41-52.

31- Oktay Yılmaz, Kadir Kırkköprü, "Profil Ekstrüzyonunda Kalıptan Dengeli Malzeme Çıkışı Sağlamak için Bir Yöntem", 05/2008, s. 505-513, IV. Ege Enerji Sempozyumu, İzmir

32-O. Yılmaz, K. Kırkköprü, "Profil Ekstrüzyonunda Dengeli Malzeme Çikişi için Kesiti Dairesel Kanallara Bölme Yöntemi", 10/2008, Anova Kullanıcılar Konferansı, Ankara,

33-Yilmaz, O . and Kirkkopru, K. " A Method to Obtain Balanced Flow in Profile Extrusion Dies", Society of Plastic Engineers, Annual Technical Conference, Chicago, USA, 22-24 June, 2009.

34- Ayder, E., Ilikan, A., Sen, M., Ozgur, C., Kavurmacioglu, L. and Kirkkopru, K, "Experimental Investigation of The Complete Characteristics of Rotodynamic Pumps," Proceedings of FEDSM2009, ASME 2009 Fluids Engineering Division Summer Meeting, Vail, Colorado, USA, August 2-6, 2009.

35- Yilmaz, O., Gunes, H. and Kirkkopru, K., "Design Optimization of an L-Shaped Extrusion Die", ASME International Mechanical Engineering Congress & Exposition IMECE2009, Florida, USA, 13-19 November 2009.

36-Gören G., Balaban M., Yılmaz O., Kırkköprü K., Doğu M., "Plastik Boru Üretimi İçin Spiral Kanallı Ekstrüzyon Kalıbının Sistematik Tasarımı", 05/2010, 3. Ulusal Polimer Bilim ve Teknoloji Kongresi, Kocaeli Üniversitesi - Umuttepe Yerleşkesi, Mayıs 2010

37- Yılmaz O., Kısasöz E., Güner F. S., Nart C., Gökgöz I., Doğu M. ve Kırkköprü K., "The Effects of Operating Conditions on the Design of Conical Spiral Mandrel Dies", 7th International Conference on Computational Heat and Mass Transfer, June 18-22, Yeditepe Üniversitesi, Türkiye, 2011.

38- Nart, C, Yilmaz, O and Kirkkopru, K, "The Effects of Operating Conditions on the Design of Radial Spiral Mandrel Dies", ASME International Mechanical Engineering Congress & Exposition, IMECE2011, Denver, Colorado, USA, November 11-17, 2011,

39- A. Begüm Baş, Oktay Yılmaz, Mustafa Doğu, Kadir Kırkköprü, F. Seniha Güner, "Grafit- Polipropilen Kompozitlerin Reolojik Özelliklerinin İncelenmesi", 2012, 10'ncu Ulusal Kimya Mühendisliği Kongresi, Koç Üniversitesi-İstanbul, 03.09.2012 - 06.09.2012

40- O. Yilmaz and K. Kirkkopru, Design of Conical Coat-Hanger Dies for Plastics Extrusion by Analytical Approach Aided by CFD, 2nd International Scientific Conference on Engineering, Antalya, 22.11.2012-24.11.2012.

41- O. Yılmaz, G. Gören, M. Balaban and K. Kırkköprü, "The Systematical Design Of Plastic Spiral Extrusion Dies And Validation of the Design Methodology By CFD Analyses", (in Turkish) "Spiral Plastik Ekstrüzyon Kalıplarının Sistematik Tasarımı ve SAD Yardımıyla Tasarım Metodolojisinin Doğrulanması", Sigma Mühendislik ve Fen Bilimleri Dergisi, cilt 31, sf. 335-349, 2013.

42- O. Yilmaz, E. Kısasöz , F. S. Guner , C. Nart , and K. Kirkkopru**, "**A Comprehensive 3D Analysis of Polymer Flow through a Conical Spiral Extrusion Die**",** Fibers and Polymers, Vol. 15, No 1, 84-90, Springer- Verlag, 2014. **(SCI)**

43- O. Yilmaz, H. Gunes and K. Kirkkopru, "Optimization of a Profile Extrusion Die for Flow Balance", Accepted For Publication , Fibers and Polymers (Springer), Sept 2013. **(SCI)**

44- Yilmaz O., Bas A. B., Dogu M., Guner F. S. ve Kirkkopru K, "Melt Flow Properties of Graphite Nanoplatelets Filled Polypropylene", Journal of Composite Materials (Sage), in preparation, (2013).

45- Yilmaz O. ve Kirkkopru K., "Process Material Independent Design of Conical Coat-Hanger Dies by Analytical Approach", Journal of Applied Polymer Science (Wiley), in preparation, (2013).

Book:

K. Kırkköprü ve E. Ayder, *Akışkanlar Mekaniği* , Literatür Yayınları, 2004 (Fluid Mechanics, F. M. White, 4th Edition'ın Türkçesi.

Projects (some) :

- Experimental and Theoretical Investigation of the Efficiency of a Radial Pump Impeller) , ITU Research Fund, Principal Investigator, (1996-1997)
- Computational Optimization of Air Distribution Channel of an Urban Bus, Principal Investigator, ITU GV,1997
- Fluid Dynamics & Mathematical Combustion: Analysis of Reactive Flow in Solid Rocket Motor Chambers, NATO-CRG., Co-Principal Investigator on Turkish side., (1997-1999)
- Computational Investigation of Internal Flow Instabilities in Solid Propellant Rocket Motors, ITU Scientific Research Project, Principal investigator, (2004-2005)
- Experimental Investigation of Complete Pump Characteristics, Tubitak 1001 Project, worked as researcher, (2005-2007).
- Experimental Measurement and Computational Modeling of Rheological Properties of Compounded Polymers and Designing of Spiral Dies in Extrusion, funded by the Ministry of Industry, Principal Investigator, (2009-2012)
- Refrigerant Induced Noise Control (2010- 2012)
- Washer/ Dryer (2011- ….)
- Development of Blow Molding Machine (2012-2013)

Recent Consultantships:

-Consultant for Çığır Kimya for the development of a Blow Molding Machine (2012-2013)
-Consultant for Vestel Refrigerator Factory for the reduction of flow induced noise and the increment of cooling performance (2010-2012).
-Consultant for Vestel Washing Machine Factory for the development of washer-dryer machine (2011-)
-Consultant for Gersan in modelling the heat transfer problem in Zinc Coating Furnace that involves radiation and convection (2011)

Yüksek Lisans Tezleri

1-" Katı Yakıtlı Roketlerde Daimi Olmayan Akışların Sayısal Modellenmesi", Uğur M. Güven, Y. Lisans Tezi,1997

2-" İç Akışların Sayısal Modellenmesi" , Barış Gümüşel,Y.Lisans Tezi,1999.

3-" Merkezkaç Pompa Çark Performansı Tayini", Abdullah Hamarat, Y.Lisans Tezi, 2002.

4-"Sıkıştırılabilir İç Akışların Sonlu Hacimler Yöntemi ile İncelenmesi", A. Serkan Akyürek, Y. Lisans Tezi, 2003

5-"Investigation of Compressible Flow inside Solid Propellant Rocket Motor Combustion Chamber Using Various Turbulence Closure Models", Ulaş G. Yüksel, Y. Lisans Tezi, 2005.

6-"Buzdolabı Buharlaştırıcı Isı Geçiş Performansının Deneysel Olarak İncelenmesi," Burak Aşureciler, Y. Lisans Tezi, Haziran 2006.

7-"Polimer Malzemelerin Ekstrüzyonunun Deneysel ve Sayısal Olarak İncelenmesi, Oktay Yılmaz," Y. Lisans Tezi, Haziran 2007.

8- "Plastik Boru Üretimi İçin Spiral Kanallı Radyal Ekstrüzyon Kalıbının Sistematik Tasarımı", Çağrı Nart, Y. Lisans Tezi, Haziran 2011.

9-" Orta Yüksek Özgül Hızlı Pompalarda Tasarım, Çark-Salyangoz Optimizasyonu ve Kavitasyon", Didem Kayabaşı, devam ediyor.

10-"Eksenel Fan Tasarımı ve Gürültüsü", Burak Bayrak, devam ediyor.

Doktora Tezleri

1- "Numerical Simulation of Unsteady Flows in Solid Rocket Motors with Deforming Grids", Murat UYGUN, Doktora Tezi, Kasım 2007.

2- "Katkılı Polimerlerin Ekstrüzyonu ve Koekstrüzyon Kalıbı Tasarım Metodolojisinin Geliştirilmesi", Oktay YILMAZ , Doktora Tezi, Haziran, 2013.

3- "Katı Yakıtlı Roket Motorlarında Akış-Yanma Etkileşimi", M. Özer Havlucu, devam ediyor.