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Date of Birth : 11.01.1970  
Title /Position : Prof. Dr. / Faculty Member  
Institution : Izmir Institute of Technology, Department of Mathematics  
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## RESEARCH INTEREST

Numerical Solution of the Ordinary and Partial Differential Equations, Exact Solution of the Nonlinear Differential Equations, Geometric Integration, Operator Splitting Methods: Applications and Analysis

## EDUCATION

**Ph.D.**, Applied Mathematics, University of Delaware, USA, 1997-2000

Advisor : Richard Braun

**Dissertation Title** : Phase Boundaries and Anisotropy via Multiple – Order - parameter Theory for an fcc Alloy

**M.Sc.** Applied Mathematics, University of Delaware, 1995-1997

**BS.** Mathematics, Middle East Technical University, Turkey, 1987-1993

**Teaching Certificate** : Faculty of Education, Department of Educational Sciences, Middle East Technical University, Turkey, 1992-1993

**High School**, Istanbul Atatürk Science High School (İstanbul Atatürk Fen Lisesi) , Turkey, 1984-1987

## RESEARCH EXPERIENCE

**1995-2000** : Graduate Student , University of Delaware

**1999 June** : MPI Workshop Participant, University of Delaware

**1997 Summer** : Summer Job, University of Delaware under the advisor R.J. Braun

**2009 Summer** : Humboldt University, visitor position (2 months), supported by TÜBİTAK

**2010 Winter** : Humboldt University, visitor position (1 month), supported by DAAD

## WORK EXPERIENCE

**2005-2008** : Chair, İYTE, Faculty of Science, Department of Mathematics

**2013- present** : Prof. Dr., İYTE, Faculty of Science, Department of Mathematics

**2007-2011** : Assoc. Prof., İYTE, Faculty of Science, Department of Mathematics

**2001-2007** : Assistant Prof., İYTE, Faculty of Science, Department of Mathematics

**2000-2001** : Instructor, İYTE, Faculty of Science, Department of Mathematics

**1998-2000** : Grader, Tutorial Asst, UDEL, Dept. of Mathematics, USA

## TEACHING EXPERIENCE

**Undergraduate Courses:** Basic Calculus 121-122, Calculus 141-142, Differential Equations 255, Numerical Analysis 381

**Graduate Courses:** Advanced Linear Algebra, Numerical Analysis, Perturbation Theory, Special Topics in Applied Mathematics, Numerical Solution of PDE, Ordinary Differential Equations, Functional Analysis, Advanced Mathematics, Geometric Integration, Numerical Solution of ODE.

## PUBLICATIONS

18. Sila Ö. Korkut, Nurcan Gücüyen N., Gamze Tanoğlu, A conserved Linerization Approach for solving Nonlinear Oscillation Problems, Appl. Math. Inf. Sci. 12, No. 3, 1-7 (2018)
17. Zurnacı, F., Gücüyen N., Seydaoglu M., **Tanoğlu G.**, Convergence analysis and numerical solution of Benjamin-Bona-Mahony equation by Lie-Trotter splitting, Turkish Journal of Math., 42, (2018),1471-1483
16. Korkut Uysal S., **Tanoğlu G.**, An efficient iterative algorithm for solving non-linear oscillation problems, Filomath 31:9, 2713-2726 (2017)
15. Çiçek Y., **Tanoğlu G.**, Strang splitting method for Burgers-Huxley equation, Applied Mathematics and Computation, 276: 454 - 467 (2016)
14. Çiçek Y., **Tanoğlu G.**, Convergence Analysis for Operator Splitting Methods with Application to Burgers-Huxley Equation, Applied Mathematics and Information Sciences, 9, no: 21,1-8 (2015)
13. Baysal O., **Tanoğlu G.**, An Operator Splitting Approximation Combined with the SUPG Method for Transport Equations with Nonlinear Reaction Term, Computer Modeling in Engineering and Sciences, vol.84, no.1, pp.27-39, 2012.
12. **Tanoğlu G.**, Korkut S, On the Convergence of a New Symmetric Iterative Splitting Method for Non-Autonomous Systems, International Journal of Computer Mathematics, 89 (13-14), 1837-1846, 2012.
11. Geiser J., **Tanoğlu G.**, Gücüyen N., Higher order operator splitting methods via Zassenhaus product Formula: Theory and applications, Computer and Mathematics with Applications, 62 (6) , 1994-2015, 2011.
10. Gücüyen N., **Tanoğlu G.**, On the Numerical Solution of Korteweg-de Vries Equation by the Iterative Splitting Method, Applied Mathematics and Computation, 218 (3), 777-782, 2011.
9. Juergen G., **Tanoğlu, G.** , Operator Splitting Methods via Zassenhaus product formula, Applied Mathematics and Computations, 217:4557-4575, 2011.
8. Gucuyenen N. , **Tanoğlu G.**, Iterative operator splitting method for capillary formation model in tumor angiogenesis problem: Analysis and Application, International Journal for Numerical Methods in Biomedical Engineering, 27, 1740-1750, 2011.
7. **Tanoğlu G.**, Solitary wave solution of nonlinear multi-dimensional wave equation by bilinear transformation method, Communication in Nonlinear Science and Numerical Simulation, 12, 1195-1201, 2007.

6. Alikakos, N. D., Bates, P. W., Cahn, J. W., Fife, G. C., Fusco, G., **Tanoğlu, G. B.** Analysis of a Corner Layer Problem in Anisotropic Interfaces, Discrete and Continuous Dynamical Systems-Series B 6: 2 , 237-55, 2006.
5. **Tanoğlu G.**, Hirota Method for Solving Reaction-Diffusion Equations with Generalized Nonlinearity , Int. Journal of Nonlinear Science, Vol., No:1, pp.30-36, 2006.
4. Pashaev O., **Tanoğlu G.** , Vector Shock Soliton and the Hirota Bilinear Method, Chaos, Solitons & Fractals, 26, 95-105, 2005.
3. **Tanoğlu G.B**, Braun R.J., J.W. Cahn & G.B.McFadden, A1-L1\_0 Phase Boundaries and Anisotropy via Multiple – Order - parameter Theory for an FCC Alloy, Interfaces and Free Boundaries, 5, 1-25, 2003.
2. **Tanoğlu G.**, Ağiroğlu O. ,The Application of a Finite Difference Method to a Dynamical Interface Problem, International J. of Computational and Num. Anal. and Appl. vol. 4, No. 4, 2003.
1. A.D. MacGillivray, R.J. Braun & **Tanoğlu G.** , Perturbation Analysis of Problem of Carrier's, Studies in Applied Mathematics,104:293-311, 2000.

## Proceedings

1. S. Ö. Korkut Uysal, Y. Çiçek, G. Güraslan and G. **Tanoğlu** " A Linearization Approach for flow in Porous Media", 3rd International Porous Powder materials, ISBN: 978-975-6590-09-6, Pp. 558-62
2. S. Ö. Korkut Uysal and G. **Tanoğlu**, "A New Linearized Method for Solving Nonlinear Schrödinger Equation." Proceedings of the 15th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2015, ISBN: 978-84-617-2230-3, Pp. 679-689
3. Y. Çiçek, **G. Tanoğlu**, Converge Analysis and Application of Operator Splitting methods for Burgers-Huxley Equation,3rd Proceedings of the 14th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2014 July -7th, 2014, Costa Ballena, Rota, Cádiz (Spain), VOLUME I, pp: 300-309
- 4.**Tanoğlu G.**, Korkut S., Iterative Splitting Methods for Schrödinger Equation with Time-dependent Potential, in Proceeding, 2nd International Symposium on Computing in Science and Engineering, ISCSE 2011 1-4 June 2011, Kusadası, İzmir, pp: 153-158.
5. **Tanoğlu G.**, Korkut S., Symmetric Iterative Splitting Method for Non-Autonomous Systems, in Proceeding, 11th International Conference on Computational and Mathematical Methods in Science and Engineering,CMMSE 2011, 26-30 June 2011, Spain, pp: 1104-1112.
6. Gücüyen N., **Tanoğlu G.**, Tayfur G., Iterative operator splitting method to Solute Transport Model: Analysis and Application, in Proceeding, 2nd International Symposium on Computing in Science & Engineering, Proceeding, ISCSE 2011, 1-4 June 2011, Kusadası, İzmir, pp: 1124-1129.

**7.** J. Geiser, **G. Tanoglu**, Successive approximation for solving time-dependent problems: theoretical overview, in Proceeding, Fifth Conference on Finite Difference Methods: Theory and Applications, June 28–July 2, 2010, Lorenz, Bulgaria, 2011, pp. 58–67.

**8. Tanoğlu G.**, Pashaev O., The Hirota Method for Reaction-Diffusion Equations with three Distincts Roots , AIP Conference Proceedings, Ankara, Turkey, (729), 374-380, 2004.

**9.** Mir Kassimov R. M., **Tanoğlu G.**, Atılgan S., Different q- oscillators from the generalized factorization method, Proceeding of International Workshop SQS, Dubna, Russia, 416-421, 2003.

**10.** Mir Kassimov R. M., **Tanoğlu G.**, Non-commutative Differential calculus and q- oscillators, Proceeding of XII International Conference on Selected Problems of Modern Physics, Dubna, Russia, 1, 148,152 (2003)

## **CONFERENCES AND ABSTRACTS**

**1.** Interphase boundaries and Anisotropy via Multiple - Order - parameter Theory for an fcc Alloy, Presentation, at Third Siam Conference on Mathematical Aspect of Material Science Philadelphia, Pennsylvania, May, 22, 2000.

**2.** Phase boundaries and Anisotropy via Multiple - Order - parameter Theory for an fcc Alloy, presentation, NIST, Washington, April, 4, 2000.

**3.** Antiphase boundaries and Anisotropy in L1<sub>2</sub> via Multiple - Order - parameter Theory for an fcc Alloy, presentation, 11th American Conference on Crystal Growth & Epitaxy , August 1-6, 1999, Tucson, Arizona

**4.** Structure, Energy, Equilibria for the order-order interphase boundaries ( L1<sub>2</sub>- L1<sub>0</sub>); results from a multiple order parameter theory, presentation, International Conference on Mathematical Modelling and Scientific Computing, April 2-6, 2001, METU, Ankara, Turkey.

**5.** Phase Field Modeling, invited talk, Dynamics and Complexity of Interfaces in Materials, May 48-june-1, 2001, University of Athens Department of Mathematics, Athens, Greece.

**6.** Poster Presentation, NATO-ASI 2002, Computer Simulation Surfaces and Interfaces, Sept 09-2002, Albena, Bulgaria.

**7.** Computer Simulation of the Interphase boundaries and Anisotropy via Multiple - Order - parameter Theory for an fcc Alloy, talk, The 14th Domestic, Mathematical Conference, July 04-07, 2002, Mersin, Turkey.

**8.** Twelfth International Colloquim on Numerical Analysis and Computer Science with Applications, Plovdiv, Bulgaria, August 12-17, 2003.

**9.** The Hirota Method for Reaction-Diffusion Equations with three Distincts Roots, paper presentation, International Workshop on Global Analysis, April 15-17, 2004, Ankara, Turkey.

- 10.** Bilinear Method of Finding Exact Analytic One Soliton Solution of some Class of Nonlinear Differential Equations, talk, The 17th Domestic, Mathematical Conference, July 23-26, 2004, Bolu, Turkey.
- 11.** Vector Shock Soliton of Vector Wave Equation in Three Space Dimension, abstract, page:49, Mathematical Methods for Engineering and Sciences, 27-29 April, 2006, Ankara/Turkey.
- 12.** Vector Shock Soliton of Vector Wave Equation in Three Space Dimension, abstract, page:49, Mathematical Methods for Engineering and Sciences, 27-29 April, 2006, Ankara/Turkey.
- 13.** Vector shock soliton solution of wave equation in three space dimension by bilinear transformation method, abstract, [http://icm2006.org/AbsDef/Shorts/abs\\_1155.pdf](http://icm2006.org/AbsDef/Shorts/abs_1155.pdf), International Congress of Mathematicians, 22-30 August, 2006, Madrid/Spain.
- 14.** Geometric Integration, Workshop on Geometric Integration, İzmir/Turkey, July 25, 2008, İzmir/Turkey.
- 15.** Higher order modifying integrators for separable equations, abstract, Workshop on Splitting Methods in Time Integration, October 15-18, 2008, Innsbruck, Austria.
- 16.** Higher order Operator –Splitting Methods based on the Zassenhaus Product Formula, Humboldt University Departments of Mathematics Seminars, Berlin/Germany, August, 5, 2009.
- 17.** Higher order symplectic integrators based on modified vector fields, MASSEE International Congress on Mathematics MICOM 2009, Ohrid, Republic of Macedonia, September 16-20, 2009, **presented by H. Gündüz.**
- 18.** Operator -Splitting Methods for Partial Differential Equations, İzmir Uygulamalı Matematik ve Bilgisayar Bilimleri, İzmir, May, 06, 2010.
- 19.** Higher order Operator –Splitting Methods via Zassenhaus Product Formula: Theory and Application, 8th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, Dresden, May, 28, 2010.
- 20.** On the Numerical Solution of Korteweg-de Vries Equation by the Iterative Splitting Method, " International Congress in Honour of Professor H. M. Srivastava on his 70th Birth Anniversary", Bursa, Turkey, August 18-21, 2010, **presented by N. Gücüyen.**
- 21.** Symmetric Iterative Splitting Method for Non-Autonomous Systems , 11th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2011, Spain, 26-30 June 2011.
- 22.** Error Analysis of Splitting Methods for Non-Autonomous Systems, Proceeding Book of International Conference on Applied Analysis and Algebra - Abstracts, İstanbul, ICAAA2011, Pp:127, **presented by S. Korkut.**
- 23.** İterasyona Dayanan Yeni bir Operatör Ayırım Metodunun Uygulaması ve Analizi, XXIV. Ulusal Matematik Sempozyumu, Uludağ Üniversitesi Bursa, 07-10 Eylül 2011.
- 24.** Convergence analysis of iterative operator splitting method for abstract Cauchy problem, International Conference on Applied, Analysis and Algebra, İstanbul, Turkey, 29-30 June, 1-2 July 2011, **presented by N. Gücüyen.**

**25.** Iterative operator splitting methods for capillary formation in tumor angiogenesis problem: Analysis and Application, International Conference on Mathematical Methods and Models in Biosciences, Bulgaria, 15-18 June 2011, **presented by N. Gücüyenen.**

**26.** Comparisons and Applications of Symmetrical Iterative Splitting Method, International Conference on Applied and Computational Mathematics, Oct 3-6 2012, Ankara, Turkey.

**27.** Convergence Analysis and Application of Operator Splitting methods for Burgers-Huxley Equation, International Conference on Computing and Mathematical Methods in Science and Engineering, July 3-7, 2014, Rota, Cadiz-Spain.

**28.** Çiçek Y., Tanoğlu G., Convergence Analysis of Strang Splitting Method for Burgers-Huxley Equation, International Conference on Recent Advances in Pure and Applied Mathematics, Antalya, Turkey, 06-09 November, page:71

**29.** Zürnacı F., Gücüyenen N., Seydaoğlu M., Tanoğlu G., Convergence Analysis and Numerical solution of Benjamin-Bona-Mahony Equation by Lie-Trotter Splitting, International Conference on Recent Advances in Pure and Applied Mathematics (ICRAPAM 2014), Antalya, Turkey, 6-9 November 2014, page:256

**30.** N. Imamoglu, G. Guraslan and G. Tanoglu, Numerical Solution of Burger Equation by Using General Frechet Derivatives Combined with Differential Quadrature, International Conference on Recent Advances in Pure and Applied Mathematics, 6-9 November 2014 page:137

**31.** Tanoğlu G., Korkut S.O. A New Operator Splitting Method for Non-Linear Systems and Its Abstract Analysis, International Conference on Recent Advances in Pure and Applied Mathematics, Antalya, Turkey, 6-9 November 2014, Page: 224

**32.** İmamoglu Karabaş N., G. Güraslan and G. **Tanoğlu**, Yilmaz Y., Frechet Derivative Based Linearization Method For Burger-Type-Equation, International Workshop on Mathematical Methods in Engineering, Ankara, 2017, ISSN: 978-975-6734-19-3, Pp: 125.

**33.** İmamoglu Karabaş N., Erdoğan U., Korkut S.O., G. **Tanoğlu**, On the weak convergence of exponential integrators for Stochastic ordinary differential equations, The 8.th International Workshop on Differential Equations and Applications, Aydın, 2017, Pp:14.

## **PROJECTS**

- 1.** Development of the Computer Algorithm for Molecular Dynamics Simulations, TUBITAK-SLOVENYA, TBAG-U/104 (104T105, Director of the project)
- 2.** Nonstandard Finite Difference Method for Nonlinear Parabolic Differential Equations, BAP, 2004 IYTE 27, Director of the project
- 3.** Solution of the Mathematical Model of Interface Problem by New Modern Mathematical Techniques, BAP, 2002 IYTE 25, Director of the project
- 4.** Numerical Solution of the Highly Oscillatory Problem by Magnus Series Method BAP, 2004 IYTE 21, Director of the project
- 5.** Numerical Solution of Differential Equation by Geometric Integration, BAP, 2007 IYTE 18, Director of the project.

6. Development of a new algorithm for numerical solution of stochastic differential equations, BAP, 2016 IYTE 35, Director of the project.

## **THESIS**

### **I. Master Students**

1. Onur Agiroglu, The Application of a Finite Difference Method to a Dynamical Interface Problem, IYTE, 2001-2004.
2. Arzu Kiran, Nonstandard Finite Difference Method for Differential Equations, IYTE, 2002-2005.
3. Deniz Güçoğlu, Exact Solution of the Nonlinear Partial Differential Equations by Hirota Method, IYTE, 2002-2005.
4. Bengi Kanat, Numerical Solution of the Highly Oscillatory Problem by Magnus Series Method, IYTE, 2003-2006.
5. Duygu Demir, Higher Order Symplectic Methods Based on the Modified Vector Fields , 2006-2009.
6. Pınar İnce, Geometric Integrators Method for Differential Equations, 2006-2009
7. Yeşim Yazıcı, Splitting Methods for ODE , 2008-2010
8. Hakan Gündüz , Higher Order Symplectic Methods for Separable Hamiltonian Equations, 2008-2010
9. Sıla Korkut, Operator Splitting Methods for Non-Autonomous Differential Equations 2009-2012
10. Melek Sofyalıoğlu, Numerical Solutions of the Reaction-Diffusion Equations by Exponential Integrators, 2012-2014
11. Fatma Zürcacı, Converge Analysis and Numerical Solutions of the Fisher's and Benjamin-Bono-Mahony Equations by Operator Splitting Method, 2011-2014.
12. Neslişah İmamoğlu, Two Numerical Approaches for solving Stiff Differential Equation, 2012-2014.
13. Elif Hacisalihoğlu, System of Parabolic Equations via Operator splitting, 2016-

### **II. PhD Students**

1. Nurcan Gücüyeneni, Iterative Splitting Method for System of Nonlinear Parabolic Equations , 2008-2013.
2. Onur Baysal, Stabilized Finite Element Methods for Time Dependent Convection-Diffusion Equations, 2009-2013.
3. Yeşim Yazıcı, Converge Analysis of Operator Splitting Methods for Burger-Huxley Equation, 2012-2015.
4. Sıla Korkut, New approaches for Solving Nonlinear Oscillation Problems, 2012-2015.
5. Neslişah İmamoğlu Karabaş, A new linearization Technique and its application, 2017-

## **HONORS AND ACTIVITIES**

1. Tubitak scholarship, 1988-1989
2. Honor student in Mathematics department in METU 1988-1989, 1990-1991
3. Scholarship for 5 years from Ministry of Education for Ph.D in USA
4. DFG-Tübitak, Exchange program scholarship visiting 2 months, Humboldt University/Germany
5. DAAD, Exchange program scholarship visiting 1 month, Humboldt University/Germany

## **WORKSHOP ORGANIZER**

- 1.** Workshop on Numerical Methods for Differential Equations, 12 May 2006, IYTE Department of Mathematics
- 2.** Workshop on Geometric Integration, 25 July 2008, IYTE Department of Mathematics
- 3.** Workshop on Numerical Solutions of Nonlinear PDEs, 26.06.2015, IYTE Department of Mathematics
- 4.** Workshop on Operator Splitting Methods, 20 January, 2014,, IYTE Department of Mathematics