

Curriculum Vitae

Dr. Shelly Arora



Official Address

Department of Mathematics,
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Contact Information

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Title of Ph.D. Thesis

Solutions of Partial Differential Equations Involving Diffusion Dispersion Phenomenon Using Weighted Residual Methods

Projects:

- Major UGC research project entitled “Modelling of Rotary Vacuum Washer Using Collocation Technique”
Cost: Rs. 12,23,800/-
Sanction No. F. No. 41-786/2012(SR).

- Awarded Raman Post-doctoral fellowship by University Grants Commission for the year 2014-15 at University of South Florida, Tampa, FL, USA.

Awards and Honors

- Awarded honourarium of \$1219.54 by Department of Mathematics, University of South Florida, Tampa, FL, USA.
- Awarded SRF by UGC, New Delhi, INDIA.
- Awarded JRF by UGC, New Delhi, INDIA.

Research Interest:

Mathematical Modelling

Broad research area: Numerical Analysis, PDEs and ODEs.

List of Ph.D. students Guided

Name of the Student	Date of Viva	Title of thesis
Happy Kumar	December 30, 2016	SOLUTION OF AXIAL DISPERSION MODEL FOR WASHING ZONE OF A ROTARY VACUUM WASHER BY HERMITE COLLOCATION
Dereje Alemu Alemar	May 16, 2017	MODELLING OF DISPLACEMENT WASHING OF POROUS STRUCTURE OF PARTICLES INVOLVING INTRAPARTICLE DIFFUSION AND LONGITUDINAL DISPERSION COEFFICIENTS

Research and Teaching Experience:

- ✓ Worked as Raman Post-doctoral fellow in CIIM, University of South Florida, Tampa, FL, USA under the supervision of Professor A.Z. Grinshpan..
- ✓ Working as Lecturer in Department of Mathematics, Punjabi University, Patiala from 23rd October, 2006 to till date.
- ✓ Worked as Lecturer in Department of Mathematics, G.N.D. University, Amritsar from 03rd July, 2006 to 19th October, 2006.
- ✓ Worked as SRF (NET) in Department of Mathematics, SLIET, Longowal from Jan. 1, 2005 to June 30, 2006.
- ✓ Worked as JRF (NET) in Department of Mathematics, SLIET, Longowal from Dec. 18, 2002 to Dec. 31, 2004.

Subjects Taught

- ✓ Functional Analysis
- ✓ Numerical Analysis
- ✓ Differential Equations
- ✓ Mathematical Statistics
- ✓ Discrete Mathematics

- ✓ Solid Mechanics
- ✓ Differential Geometry
- ✓ Classical Mechanics
- ✓ Fluid Mechanics

Membership

- ✓ Life member Punjab Academy of Sciences. L – 415 (Membership No.)
- ✓ Life member Indian Society of Industrial and Applied Mathematics. A38 (Membership No.)
- ✓ Annual member of Society of Industrial and Applied Mathematics

List of Invited Talks

- Invited talks at DSCW, Ferozpur City in the year 2008.
- Invited talk at Rayat Bahra College in the year 2014
- Invited talk at GNKC, Budhladha in the year 2016
- Invited talk at PEC Chandigarh in the year 2016
- Invited talk at Krishna College, Budhladha in the year 2016
- Visited GGSW University to conduct the viva-voce of master student's during the year 2016.
- Attended orientation course from March 02-29, 2011.
- Attended refresher course from May14 to June 06, 2012.
- Attended refresher course from June 20 to July 19, 2016.

List of Publications

International Journals

- 1) **Shelly Arora**, S.S. Dhaliwal & V.K. Kukreja (2005). "Solution of Two Point Boundary Value Problems Using Orthogonal Collocation on Finite Elements." *Applied Mathematics & Computation*. 171 (1), 358-370.
- 2) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2006). "Simulation of Washing of Packed Bed of Porous Particles by Orthogonal Collocation on Finite Elements." *Computers and Chemical Engineering*. 30 (6-7), 1054-1060.
- 3) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2006). "Application of Orthogonal Collocation on Finite Elements for Solving Non Linear Boundary Value Problems." *Applied Mathematics & Computation*. 180, 516-523.

- 4) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2006). "A Computationally Efficient Technique for Solving Two Point Boundary Value Problems in Porous Media." *Applied Mathematics & Computation*.183(2), 1170-1180.
- 5) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2007). "Computationally Efficient Technique For Weight Functions and Effect of Orthogonal Polynomials on the Average." *Applied Mathematics & Computation*.186 (1), 623-631.
- 6) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2007). "Modelling of Displacement Washing of Pulp Fibers Using Orthogonal Collocation on Finite Elements". *PAMM, Proc. Appl. Math. Mech.* 7, 2150027-2150028.
- 7) **Shelly Arora**, F. Potucek (2009). "Modelling of Displacement Washing of Packed Bed of Fibers" *Brazilian Journal of Chemical Engineering*. 26(2), 385-393.
- 8) **Shelly Arora**, F. Potucek (2009). "Modelling of Displacement Washing of Pulp: Comparison Between Model and Experimental Data" *Cellulose Chemistry & Technology*. 43(7-8), 305-313.
- 9) **Shelly Arora**, František Potůček, S.S. Dhaliwal and V.K. Kukreja (2009). "Modelling of Displacement Washing of Pulp Bed Using Orthogonal Collocation on Finite Elements". Conference proceedings of *American Institute of Physics*. 1146(1), 169-176.
- 10) Potůček, F., **Arora, S.**, Miklík, J (2010). Vytěšňovací praní sulfátové buničiny. *Chem. Listy*, vol. 104, no. 6, 506. ISSN 0009-2770.
- 11) **Arora, S., Potůček, F.**, (2010). Modelling of Displacement Washing of Pulp Bed. *Pap. Celul.*, 65(9), 255. ISSN 0031-1421.
- 12) I. A. Ganaie, **Shelly Arora** and V.K. Kukreja (2013). "Modelling and Simulation of a Packed Bed of Pulp Fibers Using Mixed Collocation Method". *Int. J. Diff. Eqs.*, 2013, 1-7.
- 13) Happy Kumar, **Shelly Arora** and R.K. Nagaich (2013). "Solution of Non Linear Singular Perturbation Equation Using Hermite Collocation Method". *App. Math. Sci.*, 7(109), 5397-5408.
- 14) Inderpreet Kaur, **Shelly**. (2014). Numerical Solutions of Two Point Boundary Value Problems Using Collocation Techniques. *Int. J. Sci. Engg. Res.*, 5(1), 718-726.
- 15) Ishfaq Ahmad Ganaie, **Shelly Arora**, VK Kukreja (2014). Cubic Hermite Collocation Method for Solving Boundary Value Problems with Dirichlet, Neumann and Robin Conditions. *Int. J. Engg. Math.* 2014, 1-8.
- 16) **Shelly Arora.**, VK Kukreja, Frantisek Potucek. (2014). Analytic solution of biparameter axial dispersion model. *Comm. App. Ind. Math.* 5, DOI: 10.1685/journal.caim.458. 1-11
- 17) Ishfaq Ahmad Ganaie, **Shelly Arora**, VK Kukreja (2015). Cubic Hermite Collocation Solution of Kuramoto Sivansiki Equation. *Int. J. Comp. Math.* 2015, 1-13.
- 18) **Shelly Arora.**, Inderpreet Kaur, Frantisek Potucek. (2015). Modelling of displacement washing of pulp fibers using Hermite collocation method. *BJChE*. 32(2), 563-575.
- 19) **Shelly Arora.**, Indrepreet Kaur, Happy Kumar, VK Kukreja. (2017). A robust technique of cubic Hermite collocation for solution of two phase non linear model. *JKSU-ES*. 29, 159-165

- 20) **Shelly Arora.**, Indrepreet Kaur. (2016). An efficient scheme for numerical solution of Burgers' equation using quintic Hermite interpolating polynomials. *Arabian Journal of Mathematics*. 5, 23-34.
- 21) **Shelly Arora.**, Indrepreet Kaur. (2015). Numerical solution of heat conduction problems using orthogonal collocation on finite elements. *J. Nigerian Mathematical Society*. 34(3), 286-302.

National Journals

- 1) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2005). Numerical Solution of a Packed Bed Model Using Orthogonal Collocation. *Mathematical Biology-Recent Trends*, Anamaya Publishers, Eds. Peeyush Chandra & B.V. Rathish Kumar.
- 2) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2006). Modelling of the Displacement Washing of Pulp Fibre Bed. *Indian J. Chem. Tech.* 13, 433-439.
- 3) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2008). Mathematical Modelling of the Washing Zone of an Industrial Rotary Vacuum Washer. *Indian J. Chem. Tech.* 15, 332-340.
- 4) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2009). Convergence of Orthogonal Collocation on Finite Elements For Parabolic Partial Differential Equations. *Indian J. Ind. App. Math.* 1 (2), 63-72.
- 5) **Shelly Arora**, F. Potucek (2012). Verification of Mathematical Model For Displacement Washing of Kraft Pulp Fibers. *Indian J. Chem. Tech.* 19, 140-148.
- 6) Amandeep Kaur, **Shelly**, Kukreja VK (2013). Analytic Solution of Axial Dispersion Model Using Laplace Transform. *Indian J. Ind. App. Math.* 4 (2), 1-9.
- 7) Pardeep Kaur, **Shelly**, Frantisek Potucek (2014). Numerical Solution of Axial Dispersion Model Using Orthogonal Collocation Method. *Indian J. Ind. App. Math.* 5(1), 35-41.
- 8) **Shelly Arora.**, Indrepreet Kaur, Amandeep Kaur (2014). Study of 1D reaction diffusion problem using Hermite collocation method. *Indian J. Ind. App. Math.* 5(2), 105-110.
- 9) **Shelly Arora**, Happy Kumar (2017). Solution of Time Dependent Linear Singular Perturbation Problems Using Collocation Techniques with Hermite Basis. *Indian J. Ind. App. Math.* (Accepted).
- 10) **Shelly Arora**, Dereje Alemu Alemar, Amandeep Kaur (2017). Approximation of Burger equation by Orthogonal Collocation Method with base shifted Jacobi Polynomials $P_n^{(\alpha,\beta)}$ for different values of α and β . *Indian J. Ind. App. Math.* (Accepted).

Papers Presented in Conferences

- 1) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2006). "On The Convergence Behavior of the Method of Orthogonal Collocation on Finite Elements." International Congress of Mathematicians, Madrid (Spain).
- 2) **Shelly Arora**, S.S. Dhaliwal and V.K. Kukreja (2007). "Modelling of Washing of Packed Bed of Porous Particles". International Congress in Industrial and Applied Mathematics, Jammu University, Jammu (India).
- 3) **Shelly Arora**, F. Potucek (2010). "Modelling of Displacement Washing of Pulp Bed" Int. Conf. SPPC. Pardubice (Czech Republic).

- 4) **Shelly Arora**, Happy Kumar and R.K. Nagaich (2010). “Modelling of washing of a pulp bed using axial dispersion model” Satellite Conference of International Congress of Mathematicians, New Delhi (India).
- 5) **Shelly Arora**, V.K. Kukreja (2010). “Numerical Solution of Axial Dispersion Model Using Orthogonal Collocation on Finite Elements”. International Conference: Computational Methods in Applied Mathematics, Bedlewo, Poland.
- 6) **Shelly Arora**, V.K. Kukreja (2010). “Modelling of washing zone of brown stock washer” International Congress of Mathematicians, Hyderabad, India.
- 7) **Shelly Arora**., Frantisek Potucek. (2013). Verification of Mathematical Model For Displacement Washing of Unbleached Kraft Pulp. Proceedings of 40th International Conference of SSCHE, Tatransk´e Matliare, Slovakia.
- 8) Kaur Amandeep., **Shelly** (2013). “Analytic Solution of One Dimensional Axial Dispersion Model Using Laplace Transforms”. National conference on Recent Advances in Continuum Mechanics. HP University, Shimla.
- 9) Pardeep Kaur., **Shelly** (2013). “Numerical Solution of Non Linear Axial Dispersion Model Using Orthogonal Collocation Method”. National conference on Recent Advances in Continuum Mechanics. HP University, Shimla. March 29-30, 2013.
- 10) Inderpreet Kaur., **Shelly** (2013). “Numerical Solution of Axial Dispersion Model Involving Two Parameters Using Orthogonal Collocation on Finite Elements”. National conference on Recent Advances in Continuum Mechanics. HP University, Shimla. March 29-30, 2013.
- 11) **Shelly Arora**., Arcadii Z Grinshpann (2015). “Applications of Weighted convolution inequalities to PDEs” 13th international symposium on orthogonal polynomials, special functions and applications, NIST, Gaithersburg, Maryland, USA.
- 12) **Shelly Arora** (2016). “Applications of Hypergeometric Techniques to Analysis of Singular Perturbation Problems” 32nd Southeastern Analysis Meeting (SEAM 2016), USF, Tampa, Florida, USA.
- 13) **Shelly Arora**., Arcadii Z Grinshpann (2016). “Convolutions in Time Dependent Heat Conduction Equations” International Conference in Mathematical Analysis and Applications (ICMAA), IIT Roorkee, Roorkee.
- 14) Sergei Abramovich., **Shelly Arora**., Arcadii Z Grinshpann (2017). “Action learning breaks out mindset in mathematics” Indo-US global Expo Summit, Indus Foundation, Hyderabad, Telangana, INDIA.