Bibliography

- J. Stefan, "Über einige probleme der theorie der wärmeleitung," Sitzungber., Wien, Akad. Mat. Natur, vol. 98, pp. 473–484, 1889a.
- [2] G. Lamé and B. Clapeyron, "Mémoire sur la solidification par refroidissement d'un globe liquide," in Annales Chimie Physique, vol. 47, pp. 250–256, 1831.
- [3] J. M. Hill, One-dimensional Stefan problems: an introduction, vol. 31. Longman Sc & Tech, 1987.
- [4] J. Stefan, "Über die diffusion von säuren und basen gegen einander," Monatshefte für Chemie und verwandte Teile anderer Wissenschaften, vol. 10, no. 1, pp. 201–219, 1889b.
- [5] L. Brillouin, "Wärmestrahlung. allgemeine definitionen; gesetze von kirchhoff und Stefan," in Die Quantenstatistik und Ihre Anwendung auf die Elektronentheorie der Metalle, pp. 1–16, Springer, 1931.
- [6] L. S. Leibenzon, Handbook of Oil-Field Mechanics, vol. Pt. 4. Hydraulics, 1931.
- [7] A. Huber, "Über das fortschreiten der schmelzgrenze in einem linearen leiter," ZAMM-Journal of Applied Mathematics and Mechanics/Zeitschrift für Angewandte Mathematik und Mechanik, vol. 19, no. 1, pp. 1–21, 1939.

- [8] L. Rubinstein, "On the solution of Stefan's problem," Bull. Acad. Sci. URSS. Sér. Géograph. Géophys. (Izvestia Akad. Nauk SSSR), vol. 11, pp. 37–54, 1947.
- [9] G. W. Evans, E. Isaacson, J. MacDonald, et al., "Stefan-like problems," Quarterly of Applied Mathematics, vol. 8, no. 3, pp. 312–319, 1950.
- [10] J. R. Ockendon and W. R. Hodgkins, "Moving boundary problems in heat flow and diffusion," *Clarendon Press*, Oxford, England. 1975, 300, 1975.
- [11] A. Gliko and A. Efimov, "The method of a small parameter in the classical Stefan problem," *Journal of engineering physics*, vol. 38, no. 2, pp. 211–216, 1980.
- [12] I. Kolodner, "Free boundary problem for the heat equation with applications to problems of change of phase," *Communications on Pure and Applied Mathematics*, vol. 9, no. 1, pp. 1–31, 1956.
- [13] L. Rubinstein, "The Stefan problem, transl. math," Monographs, vol. 27, pp. 327–3, 1971.
- [14] H. S. Carslaw and J. C. Jaeger, "Conduction of heat in solids," Conduction of heat in solids, 1947.
- [15] Y. Chuang and J. Szekely, "The use of green's functions for solving melting or solidification problems in the cylindrical coordinate system," *International Journal of Heat and Mass Transfer*, vol. 15, no. 5, pp. 1171–1174, 1972.
- [16] E. Hansen and P. Hougaard, "On a moving boundary problem from biomechanics," *IMA Journal of Applied Mathematics*, vol. 13, no. 3, pp. 385–398, 1974.

- [17] T. R. Goodman, "The heat-balance integral and its application to problems involving a change of phase," *Transactions of the American Society of Mechanical Engineers*, vol. 80, no. 2, pp. 335–342, 1958.
- [18] T. R. Goodman and J. J. Shea, "The melting of finite slabs," 1960.
- [19] T. Lardner and F. Pohle, "Application of the heat balance integral to problems of cylindrical geometry," 1961.
- [20] G. Poots, "On the application of integral-methods to the solution of problems involving the solidification of liquids initially at fusion temperature," *International Journal of Heat and Mass Transfer*, vol. 5, no. 6, pp. 525–531, 1962.
- [21] T. R. Goodman, "Application of integral methods to transient nonlinear heat transfer," in Advances in heat transfer, vol. 1, pp. 51–122, Elsevier, 1964.
- [22] B. Boley and L. Estenssoro, "Improvements on approximate solutions in heat conduction," *Mechanics Research Communications*, vol. 4, no. 4, pp. 271–279, 1977.
- [23] W. Yuen, "Application of the heat-balance integral to melting problems with initial subcooling," *International Journal of Heat and Mass Transfer*, vol. 23, no. 8, pp. 1157–1160, 1980.
- [24] A. S. Wood, "A new look at the heat balance integral method," Applied Mathematical Modelling, vol. 25, no. 10, pp. 815–824, 2001.
- [25] F. Mosally, A. S. Wood, and A. Al-Fhaid, "An exponential heat balance integral method," *Applied mathematics and computation*, vol. 130, no. 1, pp. 87– 100, 2002.

- [26] S. L. Mitchell and T. G. Myers, "Application of standard and refined heat balance integral methods to one-dimensional Stefan problems," *SIAM review*, vol. 52, no. 1, pp. 57–86, 2010.
- [27] S. L. Mitchell and T. Myers, "Improving the accuracy of heat balance integral methods applied to thermal problems with time dependent boundary conditions," *International Journal of Heat and Mass Transfer*, vol. 53, no. 17-18, pp. 3540–3551, 2010.
- [28] S. L. Mitchell and T. G. Myers, "Application of heat balance integral methods to one-dimensional phase change problems," *International Journal of Differential Equations*, vol. 2012, 2012.
- [29] J. Hristov, "Research note on a parabolic heat-balance integral method with unspecified exponent: An entropy generation approach in optimal profile determination," *Thermal Science*, vol. 13, no. 2, pp. 49–59, 2009.
- [30] J. Hristov, "An approximate analytical (integral-balance) solution to a nonlinear heat diffusion equation," *Thermal Science*, vol. 19, no. 2, pp. 723–733, 2015.
- [31] J. Hristov, "Double integral-balance method to the fractional subdiffusion equation: approximate solutions, optimization problems to be resolved and numerical simulations," *Journal of Vibration and Control*, vol. 23, no. 17, pp. 2795–2818, 2017.
- [32] J. Hristov, "Integral-balance solution to nonlinear subdiffusion equation," Frontiers in Fractional Calculus, vol. 1, p. 70, 2018.
- [33] A. Kumar *et al.*, "Haet balance integral method for a time-fractional Stefan problem with Robin boundary condition and temperature-dependent thermal

conductivity," Computational Thermal Sciences: An International Journal, vol. 13, no. 6, 2021.

- [34] B. A. Boley, "A method of heat conduction analysis of melting and solidification problems," *Journal of Mathematics and Physics*, vol. 40, no. 1-4, pp. 300–313, 1961.
- [35] B. A. Boley, "A general starting solution for melting and solidifying slabs," International Journal of Engineering Science, vol. 6, no. 2, pp. 89–111, 1968.
- [36] B. Boley and H. Yagoda, "The three-dimensional starting solution for a melting slab," *Proceedings of the Royal Society of London. A. Mathematical and Physical Sciences*, vol. 323, no. 1552, pp. 89–110, 1971.
- [37] D. Wilson, "Existence and uniqueness for similarity solutions of one dimensional multi-phase Stefan problems," SIAM Journal on Applied Mathematics, vol. 35, no. 1, pp. 135–147, 1978.
- [38] S. Gupta, "Axisymmetric melting of a long cylinder due to an infinite flux," in Proceedings of the Indian Academy of Sciences-Mathematical Sciences, vol. 95, pp. 1–12, Springer, 1986.
- [39] F. Chernousko, "Solution of non-linear heat conduction problems in media with phase changes," *INTERNATIONAL CHEMICAL ENGINEERING*, vol. 10, no. 1, pp. 42–+, 1970.
- [40] J. Crank and R. Phahle, "Melting ice by the isotherm migration method," Brunel University Mathematics Technical Papers collection;, 1972.
- [41] J. Crank and R. S. Gupta, "Isotherm migration method in two dimensions," International Journal of Heat and Mass Transfer, vol. 18, no. 9, pp. 1101–1107, 1975.

- [42] J. Crank and A. Crowley, "Isotherm migration along orthogonal flow lines in two dimensions," *International Journal of Heat and Mass Transfer*, vol. 21, no. 4, pp. 393–398, 1978.
- [43] F. Kreith and F. Romie, "A study of the thermal diffusion equation with boundary conditions corresponding to solidification or melting of materials initially at the fusion temperature," *Proceedings of the Physical Society. Section B*, vol. 68, no. 5, p. 277, 1955.
- [44] S. Weinbaum and L. Jiji, "Singular perturbation theory for melting or freezing in finite domains initially not at the fusion temperature," 1977.
- [45] F. I. Dragomirescu, K. Eisenschmidt, C. Rohde, and B. Weigand, "Perturbation solutions for the finite radially symmetric Stefan problem," *International Journal of Thermal Sciences*, vol. 104, pp. 386–395, 2016.
- [46] F. Font, "A one-phase Stefan problem with size-dependent thermal conductivity," Applied Mathematical Modelling, vol. 63, pp. 172–178, 2018.
- [47] M. A. Biot, "New methods in heat flow analysis with application to flight structures," *Journal of the Aeronautical Sciences*, vol. 24, no. 12, pp. 857–873, 1957.
- [48] M. A. Biot, "Further developments of new methods in heat-flow analysis," Journal of the Aerospace Sciences, vol. 26, no. 6, pp. 367–381, 1959.
- [49] C. M. Elliott, J. R. Ockendon, et al., Weak and variational methods for moving boundary problems, vol. 59. Pitman Publishing, 1982.
- [50] Rizwan-uddin, "An approximate-solution-based numerical scheme for Stefan problem with time-dependent boundary conditions," *Numerical Heat Transfer*, vol. 33, no. 3, pp. 269–285, 1998.

- [51] J. Caldwell and Y. Y. Kwan, "Nodal integral and enthalpy solution of onedimensional Stefan problem," *Journal of Mathematical Sciences*, vol. 13, no. 2, pp. 99–109, 2002.
- [52] R. Grzymkowski and D. Słota, "Stefan problem solved by adomian decomposition method," *International Journal of Computer Mathematics*, vol. 82, no. 7, pp. 851–856, 2005.
- [53] S. Das and S. Rajeev, "Solution of fractional diffusion equation with a moving boundary condition by variational iteration method and adomian decomposition method," *Zeitschrift für Naturforschung A*, vol. 65, no. 10, pp. 793–799, 2010.
- [54] Rajeev, M. S. Kushwaha, and A. Kumar, "An approximate solution to a moving boundary problem with space-time fractional derivative in fluvio-deltaic sedimentation process," *Ain Shams Engineering Journal*, vol. 4, no. 4, pp. 889– 895, 2013.
- [55] X. Li, M. Xu, and X. Jiang, "Homotopy perturbation method to timefractional diffusion equation with a moving boundary condition," *Applied Mathematics and Computation*, vol. 208, no. 2, pp. 434–439, 2009.
- [56] S. Das, R. Kumar, and P. K. Gupta, "Analytical approximate solution of space-time fractional diffusion equation with a moving boundary condition," *Zeitschrift für Naturforschung A*, vol. 66, no. 5, pp. 281–288, 2011.
- [57] J. Singh, P. K. Gupta, K. Rai, et al., "Homotopy perturbation method to space-time fractional solidification in a finite slab," Applied Mathematical Modelling, vol. 35, no. 4, pp. 1937–1945, 2011.

- [58] Rajeev and M. S. Kushwaha, "Homotopy perturbation method for a limit case Stefan problem governed by fractional diffusion equation," *Applied Mathematical Modelling*, vol. 37, no. 5, pp. 3589–3599, 2013.
- [59] M. Y. Hussaini and T. A. Zang, "Spectral methods in fluid dynamics," Annual review of fluid mechanics, vol. 19, no. 1, pp. 339–367, 1987.
- [60] E. H. Doha, A. H. Bhrawy, and S. S. Ezz-Eldien, "Efficient chebyshev spectral methods for solving multi-term fractional orders differential equations," *Applied Mathematical Modelling*, vol. 35, no. 12, pp. 5662–5672, 2011.
- [61] A. Kumar, Rajeev, and J. Gómez-Aguilar, "A numerical solution of a nonclassical stefan problem with space-dependent thermal conductivity, variable latent heat and robin boundary condition," *Journal of Thermal Analysis and Calorimetry*, vol. 147, no. 24, pp. 14649–14657, 2022.
- [62] R. Gupta and D. Kumar, "A modified variable time step method for the onedimensional Stefan problem," *Computer methods in applied mechanics and engineering*, vol. 23, no. 1, pp. 101–109, 1980.
- [63] V. Voller, "Fast implicit finite-difference method for the analysis of phase change problems," *Numerical Heat Transfer*, vol. 17, no. 2, pp. 155–169, 1990.
- [64] M. Zerroukat and C. Chatwin, Computational moving boundary problems, vol. 8. * Research Studies Press, 1994.
- [65] Rizwan-uddin, "One-dimensional phase change with periodic boundary conditions," Numerical Heat Transfer: Part A: Applications, vol. 35, no. 4, pp. 361– 372, 1999.

- [66] S. Savović and J. Caldwell, "Finite difference solution of one-dimensional Stefan problem with periodic boundary conditions," *International journal of heat and mass transfer*, vol. 46, no. 15, pp. 2911–2916, 2003.
- [67] S. L. Mitchell and M. Vynnycky, "Finite-difference methods with increased accuracy and correct initialization for one-dimensional Stefan problems," Applied Mathematics and Computation, vol. 215, no. 4, pp. 1609–1621, 2009.
- [68] L. Jain, A. Kumar, and Rajeev, "A numerical study of a moving boundary problem with mixed boundary condition and variable thermal coefficients," *Computational Thermal Sciences: An International Journal*, vol. 12, no. 3, pp. 249–260, 2020.
- [69] A. Kumar and Rajeev, "A Stefan problem with moving phase change material, variable thermal conductivity and periodic boundary condition," *Applied Mathematics and Computation*, vol. 386, p. 125490, 2020.
- [70] A. Kumar and Rajeev, "A moving boundary problem with space-fractional diffusion logistic population model and density-dependent dispersal rate," Applied Mathematical Modelling, vol. 88, pp. 951–965, 2020.
- [71] d. G. Comini, S. Del Guidice, R. Lewis, and O. Zienkiewicz, "Finite element solution of non-linear heat conduction problems with special reference to phase change," *International Journal for Numerical Methods in Engineering*, vol. 8, no. 3, pp. 613–624, 1974.
- [72] M. Kawahara and T. Umetsu, "Finite element method for moving boundary problems in river flow," 1986.
- [73] C. Brebbia, J. Telles, and L. Wrobel, "Boundary element techniques. springer verlag, berlin," *Heidelberg, New York, Tokyo*, 1984.

- [74] W. L. Wendland, "On some mathematical aspects of boundary element methods for elliptic problems," in *The mathematics of finite elements and applications*, pp. 193–227, Elsevier, 1985.
- [75] S. Cho and J. Sunderland, "Phase change problems with temperaturedependent thermal conductivity," 1974.
- [76] D. Oliver and J. Sunderland, "A phase change problem with temperaturedependent thermal conductivity and specific heat," *International journal of heat and mass transfer*, vol. 30, no. 12, pp. 2657–2661, 1987.
- [77] M. Ramos, Y. Cerrato, and J. Gutierrez, "An exact solution for the finite Stefan problem with temperature-dependent thermal conductivity and specific heat," *International journal of refrigeration*, vol. 17, no. 2, pp. 130–134, 1994.
- [78] V. Voller, J. Swenson, and C. Paola, "An analytical solution for a Stefan problem with variable latent heat," *International Journal of Heat and Mass Transfer*, vol. 47, no. 24, pp. 5387–5390, 2004.
- [79] A. C. Briozzo, M. F. Natale, and D. A. Tarzia, "Existence of an exact solution for a one-phase Stefan problem with nonlinear thermal coefficients from tirskii's method," *Nonlinear Analysis: Theory, Methods & Applications*, vol. 67, no. 7, pp. 1989–1998, 2007.
- [80] A. C. Briozzo and D. A. Tarzia, "Exact solutions for nonclassical Stefan problems," *International Journal of Differential Equations*, vol. 2010, 2010.
- [81] V. Voller and F. Falcini, "Two exact solutions of a Stefan problem with varying diffusivity," *International Journal of Heat and Mass Transfer*, vol. 58, no. 1-2, pp. 80–85, 2013.

- [82] Y. Zhou, Y.-j. Wang, and W.-k. Bu, "Exact solution for a Stefan problem with latent heat a power function of position," *International Journal of Heat and Mass Transfer*, vol. 69, pp. 451–454, 2014.
- [83] Y. Zhou and L.-j. Xia, "Exact solution for Stefan problem with general powertype latent heat using kummer function," *International Journal of Heat and Mass Transfer*, vol. 84, pp. 114–118, 2015.
- [84] A. N. Ceretani, N. N. Salva, and D. A. Tarzia, "An exact solution to a Stefan problem with variable thermal conductivity and a robin boundary condition," *Nonlinear Analysis: Real World Applications*, vol. 40, pp. 243–259, 2018.
- [85] A. K. Singh, A. Kumar, et al., "A Stefan problem with variable thermal coefficients and moving phase change material," Journal of King Saud University-Science, vol. 31, no. 4, pp. 1064–1069, 2019a.
- [86] A. K. Singh, A. Kumar, and Rajeev, "Exact and approximate solutions of a phase change problem with moving phase change material and variable thermal coefficients," *Journal of King Saud University-Science*, vol. 31, no. 4, pp. 1318– 1325, 2019b.
- [87] A. Kumar, A. K. Singh, and Rajeev, "A Stefan problem with temperature and time dependent thermal conductivity," *Journal of King Saud University-Science*, vol. 32, no. 1, pp. 97–101, 2020a.
- [88] A. Kumar, A. K. Singh, and Rajeev, "A moving boundary problem with variable specific heat and thermal conductivity," *Journal of King Saud University-Science*, vol. 32, no. 1, pp. 384–389, 2020b.

- [89] B. Ross, Fractional calculus and its applications: proceedings of the international conference held at the University of New Haven, June 1974, vol. 457. Springer, 2006.
- [90] N. Y. Sonin, "On differentiation with arbitrary index," Moscow Matem. Sbornik, vol. 6, no. 1, pp. 1–38, 1869.
- [91] H. Laurent, "Sur le calcul des dérivées à indices quelconques," Nouvelles annales de mathématiques: journal des candidats aux écoles polytechnique et normale, vol. 3, pp. 240–252, 1884.
- [92] K. Nishimoto, An Essence of Nishimoto's Fractional Calculus (Calculus in the 21st Century): Integrations and Differentiations of Arbitrary Order. Descartes Press Company, 1991.
- [93] K. S. Miller and B. Ross, An introduction to the fractional calculus and fractional differential equations. Wiley, 1993.
- [94] V. Kiryakova, "Generalized fractional calculus and applications, pitman res notes math 301, longman scientific & technical: Harlow," 1994.
- [95] B. Rubin, Fractional integrals and potentials, vol. 82. CRC Press, 1996.
- [96] I. Podlubny, Fractional differential equations: an introduction to fractional derivatives, fractional differential equations, to methods of their solution and some of their applications, vol. 198. Elsevier, 1998.
- [97] R. Hilfer, Applications of fractional calculus in physics. World scientific, 2000.
- [98] A. A. Kilbas, H. M. Srivastava, and J. J. Trujillo, Theory and applications of fractional differential equations, vol. 204. elsevier, 2006.
- [99] J. Crank, Free and moving boundary problems. Clarendon press Oxford, 1984.

- [100] S. C. Gupta, The Classical Stefan Problem: Basic Concepts, Modelling and Analysis with Quasi-Analytical Solutions and Methods, vol. 45. Elsevier, 2017.
- [101] P. Tritscher and P. Broadbridge, "A similarity solution of a multiphase Stefan problem incorporating general non-linear heat conduction," *International Journal of Heat and Mass Transfer*, vol. 37, no. 14, pp. 2113– 2121, 1994.
- [102] P. Broadbridge and B. Pincombe, "The Stefan solidification problem with nonmonotonic nonlinear heat diffusivity," *Mathematical and Computer Modelling*, vol. 23, no. 10, pp. 87–98, 1996.
- [103] A. C. Briozzo and M. F. Natale, "One-phase Stefan problem with temperaturedependent thermal conductivity and a boundary condition of robin type," *Journal of Applied Analysis*, vol. 21, no. 2, pp. 89–97, 2015.
- [104] A. C. Briozzo and M. F. Natale, "A nonlinear supercooled Stefan problem," Zeitschrift für angewandte Mathematik und Physik, vol. 68, no. 2, p. 46, 2017.
- [105] A. Sellitto, D. Jou, and V. Cimmelli, "A phenomenological study of pore-size dependent thermal conductivity of porous silicon," Acta Applicandae Mathematicae, vol. 122, no. 1, pp. 435–445, 2012.
- [106] A. M. Abourabia and T. Z. Abdel Wahid, "The unsteady Boltzmann kinetic equation and non-equilibrium thermodynamics of an electron gas for the Rayleigh flow problem," *Canadian Journal of Physics*, vol. 88, no. 7, pp. 501– 511, 2010.
- [107] M. Calvo-Schwarzwälder, "Non-local effects and size-dependent properties in Stefan problems with Newton Cooling," *Applied Mathematical Modelling*, vol. 76, pp. 513–525, 2019.

- [108] A. L. Lombardi and D. A. Tarzia, "Similarity solutions for thawing processes with a heat flux condition at the fixed boundary," *Meccanica*, vol. 36, no. 3, pp. 251–264, 2001.
- [109] M. Fila and P. Souplet, "Existence of global solutions with slow decay and unbounded free boundary for a superlinear Stefan problem," *Interfaces and Free Boundaries*, vol. 3, no. 3, pp. 337–344, 2001.
- [110] M. Turkyilmazoglu, "Stefan problems for moving phase change materials and multiple solutions," *International Journal of Thermal Sciences*, vol. 126, pp. 67–73, 2018.
- [111] A. K. Singh, A. Kumar, and Rajeev, "Exact and approximate solutions of a phase change problem with moving phase change material and variable thermal coefficients," *Journal of King Saud University-Science*, vol. 31, no. 4, pp. 1318– 1325, 2019.
- [112] A. K. Singh, A. Kumar, and Rajeev, "A Stefan problem with variable thermal coefficients and moving phase change material," *Journal of King Saud University-Science*, vol. 31, no. 4, pp. 1064–1069, 2019.
- [113] L. Yao and J. Prusa, "Melting and freezing," in Advances in Heat transfer, vol. 19, pp. 1–95, Elsevier, 1989.
- [114] Rizwan-uddin, "One-dimensional phase change with periodic boundary conditions," Numerical Heat Transfer; Part A: Applications, vol. 35, no. 4, pp. 361– 372, 1999.
- [115] S. G. Ahmed, "A new algorithm for moving boundary problems subject to periodic boundary conditions," *International Journal of Numerical Methods* for Heat & Fluid Flow, vol. 16, no. 1, pp. 18–27, 2006.

- [116] Rajeev, K. N. Rai, and S. Das, "Solution of one-dimensional moving boundary problem with periodic boundary conditions by variational iteration method," *Thermal Science*, vol. 13, no. 2, 2009.
- [117] A. Kumar, A. K. Singh, and Rajeev, "A phase change problem including space-dependent latent heat and periodic heat flux," *Nonlinear Dynamics and Systems Theory*, vol. 19, no. 1-SI, 2019.
- [118] G. D. Smith, G. D. Smith, and G. D. S. Smith, Numerical solution of partial differential equations: finite difference methods. Oxford university press, 1985.
- [119] C. Çelik and M. Duman, "Crank-Nicolson method for the fractional diffusion equation with the Riesz fractional derivative," *Journal of Computational Physics*, vol. 231, no. 4, pp. 1743–1750, 2012.
- [120] S. Kutluay, A. R. Bahadir, and A. Ozdeş, "The numerical solution of one-phase classical Stefan problem," *Journal of Computational and Applied Mathematics*, vol. 81, no. 1, pp. 135–144, 1997.
- [121] Rizwan-uddin, "A nodal method for phase change moving boundary problems," *International Journal of Computational Fluid Dynamics*, vol. 11, no. 3-4, pp. 211–221, 1999.
- [122] M. Ivanovic, M. Svicevic, and S. Savović, "Numerical solution of Stefan problem with variable space grid method based on mixed finite element/finite difference approach," *International Journal of Numerical Methods for Heat & Fluid Flow*, vol. 27, no. 12, pp. 2682–2695, 2017.
- [123] J. Caldwell, S. Savovic, and Y.-Y. Kwan, "Nodal integral and finite difference solution of one-dimensional Stefan problem," J. Heat Transfer, vol. 125, no. 3, pp. 523–527, 2003.

- [124] S. Yadav, D. Kumar, and K. N. Rai,
 "Finite element Legendre wavelet Galerkin approch to inward solidification in simple body under Zeitschrift für Naturforschung A, vol. 69, no. 10-11, pp. 501–510, 2014.
- [125] M.-A. Piqueras, R. Company, and L. Jódar, "A front-fixing numerical method for a free boundary nonlinear diffusion logistic population model," *Journal of Computational and Applied Mathematics*, vol. 309, pp. 473–481, 2017.
- [126] N. Shigesada and K. Kawasaki, Biological Invasions: Theory and Practice. Oxford University Press, UK, 1997.
- [127] J. Lockwood, M. Hoopes, and M. Marchetti, *Invasion Ecology*. Blackwell Publishing, Oxford, 2007.
- [128] Y. Du and Z. Lin, "Spreading-vanishing dichotomy in the diffusive logistic model with a free boundary," SIAM Journal on Mathematical Analysis, vol. 42, no. 1, pp. 377–405, 2010.
- [129] D. G. Aronson and H. F. Weinberger, "Nonlinear diffusion in population genetics, combustion, and nerve pulse propagation," in *Partial Differential Equations and Related Topics*, pp. 5–49, Springer Berlin Heidelberg, 1975.
- [130] D. G. Aronson and H. F. Weinberger, "Multidimensional nonlinear diffusion arising in population genetics," *Advances in Mathematics*, vol. 30, no. 1, pp. 33–76, 1978.
- [131] Y. Du and Z. Guo, "Spreading-vanishing dichotomy in a diffusive logistic model with a free boundary, ii," *Journal of Differential Equations*, vol. 250, no. 12, pp. 4336–4366, 2011.

- [132] H. F. Weinberger, "On spreading speeds and traveling waves for growth and migration models in a periodic habitat," *Journal of Mathematical Biology*, vol. 45, no. 6, pp. 511–548, 2002.
- [133] H. F. Weinberger, M. A. Lewis, and B. Li, "Anomalous spreading speeds of cooperative recursion systems," *Journal of Mathematical Biology*, vol. 55, no. 2, pp. 207–222, 2007.
- [134] Rajeev and M. S. Kushwaha, "Homotopy perturbation method for a limit case Stefan problem governed by fractional diffusion equation," *Applied Mathematical Modelling*, vol. 37, no. 5, pp. 3589–3599, 2013.
- [135] V. R. Voller, "An exact solution of a limit case Stefan problem governed by a fractional diffusion equation," *International Journal of Heat and Mass Transfer*, vol. 53, no. 23-24, pp. 5622–5625, 2010.
- [136] X. Gao, X. Jiang, and S. Chen, "The numerical method for the moving boundary problem with space-fractional derivative in drug release devices," *Applied Mathematical Modelling*, vol. 39, no. 8, pp. 2385–2391, 2015.
- [137] M. D'Ovidio and P. Loreti, "Solutions of fractional logistic equations by Euler's numbers," *Physica A: Statistical Mechanics and its Applications*, vol. 506, pp. 1081–1092, 2018.
- [138] M. Ortigueira and G. Bengochea, "A new look at the fractionalization of the logistic equation," *Physica A: Statistical Mechanics and its Applications*, vol. 467, pp. 554–561, 2017.
- [139] R. A. Ims and H. P. Andreassen, "Density-dependent dispersal and spatial population dynamics," *Proceedings of the Royal Society B: Biological Sciences*, vol. 272, no. 1566, pp. 913–918, 2005.

- [140] D. J. Duffy, Finite Difference Methods in Financial Engineering: A Partial Differential Equation Approach. John Wiley & Sons, 2013.
- [141] T. E. Lee, M. J. Baines, and S. Langdon, "A finite difference moving mesh method based on conservation for moving boundary problems," *Journal of Computational and Applied Mathematics*, vol. 288, pp. 1–17, 2015.
- [142] S. Liu, Y. Du, and X. Liu, "Numerical studies of a class of reaction-diffusion equations with Stefan conditions," *International Journal of Computer Mathematics*, pp. 1–21, 2019.
- [143] M. Zheng, F. Liu, Q. Liu, K. Burrage, and M. J. Simpson, "Numerical solution of the time fractional reaction-diffusion equation with a moving boundary," *Journal of Computational Physics*, vol. 338, pp. 493–510, 2017.
- [144] C. Li and F. Zeng, "Finite difference methods for fractional differential equations," *International Journal of Bifurcation and Chaos*, vol. 22, no. 04, p. 1230014, 2012.
- [145] V. J. Lunardini, *Heat transfer with freezing and thawing*. Elsevier, 1991.
- [146] D. A. Tarzia, "A bibliography on moving-free boundary problems for the heatdiffusion equation," The Stefan and related problems, MAT-Serie A, vol. 2, 2000.
- [147] D. A. Tarzia, "Explicit and approximated solutions for heat and mass transfer problems with a moving interface," *Advanced topics in mass transfer*, vol. 20, pp. 439–484, 2011.
- [148] J. Caldwell and Y. Y. Kwan, "On the perturbation method for the Stefan problem with time-dependent boundary conditions," *International Journal of Heat and Mass Transfer*, vol. 46, no. 8, pp. 1497–1501, 2003.

- [149] N. Popov, S. Tabakova, and F. Feuillebois, "Numerical modelling of the onephase Stefan problem by finite volume method," in *International Conference* on Numerical Analysis and Its Applications, pp. 456–462, Springer, 2004.
- [150] J. Bollati, J. Semitiel, and D. A. Tarzia, "Heat balance integral methods applied to the one-phase Stefan problem with a convective boundary condition at the fixed face," *Applied mathematics and computation*, vol. 331, pp. 1–19, 2018.
- [151] H. Ribera, T. G. Myers, and M. M. MacDevette, "Optimising the heat balance integral method in spherical and cylindrical Stefan problems," *Applied Mathematics and Computation*, vol. 354, pp. 216–231, 2019.
- [152] S. L. Mitchell and S. O'Brien, "Asymptotic and numerical solutions of a free boundary problem for the sorption of a finite amount of solvent into a glassy polymer," *SIAM Journal on Applied Mathematics*, vol. 74, no. 3, pp. 697–723, 2014.
- [153] S. L. Mitchell, "Applying the combined integral method to two-phase Stefan problems with delayed onset of phase change," *Journal of computational and Applied Mathematics*, vol. 281, pp. 58–73, 2015.
- [154] M. MacDevette and T. Myers, "Nanofluids: An innovative phase change material for cold storage systems?," *International Journal of Heat and Mass Transfer*, vol. 92, pp. 550–557, 2016.
- [155] J. Hristov, "Integral-balance solution to nonlinear subdiffusion equation," Frontiers in Fractional Calculus, vol. 2017, pp. 71–106, 2017.

- [156] A. Fabre and J. Hristov, "On the integral-balance approach to the transient heat conduction with linearly temperature-dependent thermal diffusivity," *Heat and Mass Transfer*, vol. 53, no. 1, pp. 177–204, 2017.
- [157] J. Hristov, "Integral solutions to transient nonlinear heat (mass) diffusion with a power-law diffusivity: a semi-infinite medium with fixed boundary conditions," *Heat and Mass Transfer*, vol. 52, no. 3, pp. 635–655, 2016.
- [158] J. Hristov, "Multiple integral-balance method: Basic idea and an example with mullin's model of thermal grooving," *Thermal science*, vol. 21, no. 3, pp. 1555–1560, 2017.
- [159] N. Sharifi, T. L. Bergman, and A. Faghri, "Enhancement of pcm melting in enclosures with horizontally-finned internal surfaces," *International journal of heat and mass transfer*, vol. 54, no. 19-20, pp. 4182–4192, 2011.
- [160] S. Z. Shuja, B. S. Yilbas, and M. M. Shaukat, "Melting enhancement of a phase change material with presence of a metallic mesh," *Applied Thermal Engineering*, vol. 79, pp. 163–173, 2015.
- [161] M. Iasiello, M. Mameli, S. Filippeschi, and N. Bianco, "Simulations of paraffine melting inside metal foams at different gravity levels with preliminary experimental validation," in *Journal of Physics: Conference Series*, vol. 1599, p. 012008, IOP Publishing, 2020.
- [162] P. T. Sardari, R. Babaei-Mahani, D. Giddings, S. Yasseri, M. Moghimi, and H. Bahai, "Energy recovery from domestic radiators using a compact composite metal foam/pcm latent heat storage," *Journal of Cleaner Production*, vol. 257, p. 120504, 2020.

- [163] M. Iasiello, M. Mameli, S. Filippeschi, and N. Bianco, "Metal foam/pcm melting evolution analysis: Orientation and morphology effects," *Applied Thermal Engineering*, vol. 187, p. 116572, 2021.
- [164] J. Bollati and D. A. Tarzia, "Approximate solutions to one-phase Stefan-like problems with space-dependent latent heat," *European Journal of Applied Mathematics*, vol. 32, no. 2, pp. 337–369, 2021.
- [165] A. C. Briozzo and M. F. Natale, "Non-classical Stefan problem with nonlinear thermal coefficients and a Robin boundary condition," *Nonlinear Analysis: Real World Applications*, vol. 49, pp. 159–168, 2019.
- [166] J. Bollati, M. F. Natale, J. A. Semitiel, and D. A. Tarzia, "Existence and uniqueness of solution for two one-phase Stefan problems with variable thermal coefficients," *Nonlinear Analysis: Real World Applications*, vol. 51, p. 103001, 2020.
- [167] X.-Y. Zhang, Z.-T. Chen, and X.-F. Li, "Non-fourier fractional heat conduction in two bonded dissimilar materials with a penny-shaped interface crack," *International Journal of Thermal Sciences*, vol. 140, pp. 319–328, 2019.
- [168] J.-G. Liu, X.-J. Yang, and Y.-Y. Feng, "On integrability of the time fractional nonlinear heat conduction equation," *Journal of Geometry and Physics*, vol. 144, pp. 190–198, 2019.
- [169] B. Yu and X. Jiang, "Temperature prediction by a fractional heat conduction model for the bi-layered spherical tissue in the hyperthermia experiment," *International Journal of Thermal Sciences*, vol. 145, p. 105990, 2019.

- [170] X. Chi, B. Yu, and X. Jiang, "Parameter estimation for the time fractional heat conduction model based on experimental heat flux data," *Applied Mathematics Letters*, vol. 102, p. 106094, 2020.
- [171] J. Liu and M. Xu, "An exact solution to the moving boundary problem with fractional anomalous diffusion in drug release devices," ZAMM-Journal of Applied Mathematics and Mechanics/Zeitschrift für Angewandte Mathematik und Mechanik: Applied Mathematics and Mechanics, vol. 84, no. 1, pp. 22–28, 2004.
- [172] X. Li, M. Xu, and S. Wang, "Analytical solutions to the moving boundary problems with space-time-fractional derivatives in drug release devices," *Journal of Physics A: Mathematical and Theoretical*, vol. 40, no. 40, p. 12131, 2007.
- [173] X. Li, M. Xu, and S. Wang, "Scale-invariant solutions to partial differential equations of fractional order with a moving boundary condition," *Journal of Physics A: Mathematical and Theoretical*, vol. 41, no. 15, p. 155202, 2008.
- [174] J. Liu and M. Xu, "Some exact solutions to Stefan problems with fractional differential equations," *Journal of Mathematical Analysis and Applications*, vol. 351, no. 2, pp. 536–542, 2009.
- [175] Rajeev, M. S. Kushwaha, and A. Kumar, "An approximate solution to a moving boundary problem with space-time fractional derivative in fluvio-deltaic sedimentation process," *Ain Shams Engineering Journal*, vol. 4, no. 4, pp. 889– 895, 2013.
- [176] V. R. Voller, "Fractional Stefan problems," International Journal of Heat and Mass Transfer, vol. 74, pp. 269–277, 2014.

- [177] S. D. Roscani and D. A. Tarzia, "Two different fractional Stefan problems that are convergent to the same classical Stefan problem," *Mathematical Methods* in the Applied Sciences, vol. 41, no. 16, pp. 6842–6850, 2018.
- [178] V. Alexiades and A. D. Solomon, Mathematical Modelling of Melting and Freezing Processes. Hemisphere-Taylor Francis, Washington, 1993.
- [179] J. R. Cannon, The one-dimensional heat equation. No. 23, Cambridge University Press, 1984.
- [180] H. S. Carslaw and J. C. Jaeger, "Conduction of heat in solids," 1959.
- [181] Y. Du and Z. Lin, "Spreading-vanishing dichotomy in the diffusive logistic model with a free boundary," SIAM Journal on Mathematical Analysis, vol. 42, no. 1, pp. 377–405, 2010.
- [182] Sheikholeslami, M and Ebrahimpour, Z, "Thermal improvement of linear Fresnel solar system utilizing Al2O3-water nanofluid and multi-way twisted tape," *International Journal of Thermal Sciences*, vol. 176, p. 107505, 2022.
- [183] Sheikholeslami, M and Jafaryar, M and Gerdroodbary, M Barzegar and Alavi, Amir H, "Influence of novel turbulator on efficiency of solar collector system," *Environmental Technology & Innovation*, vol. 26, p. 102383, 2022.
- [184] Sheikholeslami, M and Farshad, Seyyed Ali, "Nanoparticles transportation with turbulent regime through a solar collector with helical tapes," Advanced Powder Technology, vol. 33, no. 3, p. 103510, 2022.
- [185] J. R. Cannon and H.-M. Yin, "A class of non-linear non-classical parabolic equations," *Journal of differential equations*, vol. 79, no. 2, pp. 266–288, 1989.

- [186] L. R. Berrone, D. A. Tarzia, and L. T. Villa, "Asymptotic behaviour of a nonclassical heat conduction problem for a semi-infinite material," *Mathematical methods in the applied sciences*, vol. 23, no. 13, pp. 1161–1177, 2000.
- [187] A. C. Briozzo and D. A. Tarzia, "A one-phase Stefan problem for a nonclassical heat equation with a heat flux condition on the fixed face," *Applied Mathematics and Computation*, vol. 182, no. 1, pp. 809–819, 2006.
- [188] Khodadad, F Samsami and Mirhosseini-Alizamini, SM and Günay, B and Akinyemi, Lanre and Rezazadeh, Hadi and Inc, Mustafa, "Abundant optical solitons to the Sasa-Satsuma higher-order nonlinear Schrödinger equation," Optical and Quantum Electronics, vol. 53, no. 12, pp. 1–17, 2021.
- [189] Khater, Mostafa and Jhangeer, Adil and Rezazadeh, Hadi and Akinyemi, Lanre and Akbar, M Ali and Inc, Mustafa and Ahmad, Hijaz, "New kinds of analytical solitary wave solutions for ionic currents on microtubules equation via two different techniques," *Optical and Quantum Electronics*, vol. 53, no. 11, pp. 1–27, 2021.
- [190] Sheikholeslami, M and Said, Zafar and Jafaryar, M, "Hydrothermal analysis for a parabolic solar unit with wavy absorber pipe and nanofluid," *Renewable Energy*, vol. 188, pp. 922–932, 2022.
- [191] Ahmad, Imtiaz and Ahmad, Hijaz and Inc, Mustafa and Rezazadeh, Hadi and Akbar, M Ali and Khater, Mostafa MA and Akinyemi, Lanre and Jhangeer, Adil, "Solution of fractional-order Korteweg-de Vries and Burgers' equations utilizing local meshless method," *Journal of Ocean Engineering and Science*, 2021.
- [192] Asjad, Muhammad Imran and Zahid, Muhammad and Inc, Mustafa and Baleanu, Dumitru and Almohsen, Bandar, "Impact of activation energy and

MHD on Williamson fluid flow in the presence of bioconvection," Alexandria Engineering Journal, vol. 61, no. 11, pp. 8715–8727, 2022.

- [193] Hussain, Majid and Ali, Akhtar and Yao, Shao-Wen and Ghaffar, Abdul and Inc, Mustafa, "Numerical investigation of ohmically dissipated mixed convective flow," *Case Studies in Thermal Engineering*, vol. 31, p. 101809, 2022.
- [194] Khan, Kashif Ali and Raza, Nauman and Inc, Mustafa, "Insights of numerical simulations of magnetohydrodynamic squeezing nanofluid flow through a channel with permeable walls," *Propulsion and Power Research*, vol. 10, no. 4, pp. 412–420, 2021.
- [195] S. Araci, "Novel identities involving genocchi numbers and polynomials arising from applications of umbral calculus," *Applied Mathematics and Computation*, vol. 233, pp. 599–607, 2014.
- [196] T. Kim, "On the q-extension of euler and genocchi numbers," Journal of Mathematical Analysis and Applications, vol. 326, no. 2, pp. 1458–1465, 2007.
- [197] S. Araci, E. Şen, and M. Acikgoz, "Theorems on genocchi polynomials of higher order arising from genocchi basis," *Taiwanese Journal of Mathematics*, vol. 18, no. 2, pp. 473–482, 2014.
- [198] A. Isah and C. Phang, "Operational matrix based on genocchi polynomials for solution of delay differential equations," *Ain Shams Engineering Journal*, vol. 9, no. 4, pp. 2123–2128, 2018.
- [199] A. Isah and C. Phang, "New operational matrix of derivative for solving nonlinear fractional differential equations via genocchi polynomials," *Journal of King Saud University-Science*, vol. 31, no. 1, pp. 1–7, 2019.

Research Publications

- Abhishek Kumar, Rajeev, "A Stefan problem with moving phase change material, variable thermal conductivity and periodic boundary condition", Applied Mathematics and Computation, 386:125490, 2020.
- [2] Abhishek Kumar, Rajeev, "A moving boundary problem with space-fractional diffusion logistic population model and density-dependent dispersal rate", Applied Mathematical Modelling, 88:951-965, 2020.
- [3] Abhishek Kumar, Rajeev, "Heat Balance Integral Method for a time-fractional Stefan problem with Robin boundary condition and temperature-dependent thermal conductivity", *Computational Thermal Sciences: An International Journal*, 13(6):71-84, 2021.
- [4] Abhishek Kumar, Rajeev, J. F. Gómez-Aguilar, "A numerical solution of a non-classical Stefan problem with space-dependent thermal conductivity, variable latent heat and Robin boundary condition". *Journal of Thermal Analysis* and Calorimetry, 147:14649–14657, 2022.