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## Nomenclature

$A_0$	=	Langmuir constant ( $m^3 / kg$ )
$B_0$	=	Langmuir constant ( $m^3 / kg$ )
$C$	=	Dimensionless concentration, $(c - c_s)/(c_0 - c_s)$
$c$	=	Concentration of solute in the liquor ( $kg / m^3$ )
$c_0$	=	Inlet solute concentration in the vat ( $kg / m^3$ )
$C_F$	=	Fiber consistency ( $kg / m^3$ )
$c_s$	=	Solute concentration in wash liquor ( $kg / m^3$ )
$D_L$	=	Axial dispersion coefficient ( $m^2 / s$ )
$k$	=	Apparent reaction rate constant ( $1 / s$ )
$L$	=	Thickness of the bed, $m$
$N$	=	Dimensionless concentration, $(n - c_s)/(c_0 - c_s)$
$n$	=	Concentration of solute in fibers ( $kg / m^3$ )
$Pe$	=	Peclet number, dimensionless, $uL/D_L$
$T$	=	Dimensionless time, $ut/L$
$t$	=	Time ( $s$ )
$u$	=	Interstitial velocity through bed ( $m / s$ )
$Z$	=	Dimensionless axial distance, $z/L$
$z$	=	Axial distance from point of introduction of solvent ( $m$ )
$q$	=	Inside Pore solute concentration ( $kg / m^3$ )
$Q$	=	Dimensionless concentration, $(q - c_s)/(c_0 - c_s)$
$D_L$	=	Longitudinal dispersion coefficient ( $m^2 / s$ )
$D_F$	=	Interfibre diffusion coefficient ( $m^2 / s$ )
$C_F$	=	Fiber consistency ( $kg / m^3$ )
$z$	=	Axial distance from point of introduction of solvent ( $m$ )
$u$	=	Interstitial velocity through bed ( $m / s$ )
$B$	=	Permeability coefficient ( $m^2$ )
$k_1, k_2$	=	Mass transfer coefficient ( $1 / s$ )
$k_f$	=	Film mass transfer coefficient ( $m / s$ )
$\tau$	=	Dimensionless time, $ut/L$
$K$	=	Equilibrium constant (Dimensionless),
$\xi$	=	Dimensionless axial distance, $z/L$
$r$	=	Particle solute radial position ( $m$ )
$R$	=	Fibre radius ( $m$ )
$Bi$	=	Biot number, dimensionless, $k_f \omega R / D_F K$
$\psi$	=	$R^2 u / LD_F$
Greek Symbols		
$\varepsilon$	=	Porosity of cake, dimensionless
$\mu$	=	Ratio of Porosity, $(1 - \varepsilon) / \varepsilon$
$\beta$	=	Porosity of particle

## **AUTHOR'S BIODATA**

Satinder Pal Kaur is working as Assistant Professor in Mathematics at Guru Nanak College, Sri Muktsar Sahib since 2007. Prior to this, she had taught in a Govt. promoted Engineering College, Punjabi University Guru Kashi College and a reputed Pharmacy College situated in the Sangrur district of Punjab for a period of more than 5 years. She has completed M.Sc. (Mathematics) from Punjabi University Patiala in the year 2002 and M.Phil. degree from Madurai Kamaraj University, Tamil Nadu in the year 2005. Further, she qualified CSIR-JRF (Mathematics) in December 2005. She joined her Ph.D. in the Faculty of Sciences (Mathematics Discipline) at MRSPTU, Bathinda under the guidance of Dr. Ajay Kumar Mittal, Associate Professor, Department of Mathematics, Aryabhata Group of Institutes, Barnala and Dr. Vijay Kumar Kukreja, Professor and Head, Department of Mathematics, SLIET Longowal.

Her current research work includes Numerical Methods, Mathematical Modeling and Boundary Value Problems. She has published 01 paper in SCIE indexed Journal, 03 papers in Scopus indexed Journals, 01 paper in UGC-Care listed Journal. Besides, she presented 05 papers in International conferences and 02 papers in National conferences. She has a total of 20 years of teaching experience (Postgraduate and Undergraduate classes) on her credit.

## List of Publications

1. Kaur SP, AK Mittal, VK Kukreja, N Parumasur, and P Singh. An efficient technique for solution of linear and nonlinear diffusion-dispersion models. *AIP Conference Proceedings*, Vol. 1975 (1), 030031, 2018. AIP Publishing LLC, ISSN: 1551-7616 (Scopus indexed).
2. Kaur SP, AK Mittal, V. K. Kukreja, A Kaundal, N Parumasur, and P Singh. Analysis of a linear and non-linear model for diffusion–dispersion phenomena of pulp washing by using quintic Hermite interpolation polynomials. *Afrika Matematika*, Vol. 32(5) 997-1019, 2021, Springer Nature, ISSN: 2190-7668 (Scopus indexed).
3. Kaur SP, AK Mittal & VK Kukreja, Simulation of two-dimensional nonlinear model for washing of pulp fibre bed using quintic Hermite interpolation polynomials, *Advances in Intelligent Systems and Computing*, Vol. 1412, 995-1009, 2022 Springer Nature, ISSN: 2194-5357. (Scopus indexed).
4. Kaur SP, AK Mittal & VK Kukreja, A computationally efficient technique for solution of pulp washing models, *Journal of Engineering Research*, Kuwait University, Vol. 10 (1A), 67-77, 2021, ISSN: 2307-1885 (SCIE). ISSN: 2307-1885
5. Kaur SP, AK Mittal & VK Kukreja, A computationally efficient algorithm for solution of mathematical models of displacement washing, *Advances and Applications in Mathematical Sciences*. Mili Publications, 20(11) 2549-2557, 2021, ISSN: 0974-6803 (UGC-Care). ISSN: 0974-6803.

## Papers presented in International/National conferences

1. “Application of quintic Hermite collocation scheme for solving non-linear pulp washing models” in International Conference on Frontiers in Industrial and Applied Mathematics at SLIET Longowal Punjab, India from December 21-22, 2021.
2. “Simulation of two-dimensional nonlinear model for washing of pulp fibre bed using quintic Hermite interpolation polynomial” in 7th International Conference on Mathematics and Computing (ICMC 2021) organized by IEST, Shibpur from March 02-05, 2021.
3. “Implementation of Hermite collocation for mathematical model of the pulp washing” in IEEE International Conference on Technology, Engineering, Management for Social impact using Marketing, Entrepreneurship and Talent

(TEMSMET) organized by Reva University, Bengaluru, India held on December 10, 2020.

4. “Simulation of mathematical model related to displacement washing of pulp fibre bed” in DST-FIST sponsored International Virtual Conference on Smart Advanced material science and Engineering Application (IVCSAMSEA 2020) organized by Department of Physics, KL University, Guntur, India from December 03-05, 2020.
5. “A computationally efficient algorithm for solution of mathematical model of displacement washing” in AICTE sponsored National E-Conference on Advances in Computer Vision, Artificial Intelligence and Computer Application (NECACAC-2020) organized by Pragati Engineering College, Srampalem, A.P. on November 28, 2020.
6. “Computationally efficient technique for pulp washing problems” in National Conference on Science, Engineering & Management at The Oxford College of Engineering, Bangalore, July 15-16, 2020.
7. “An efficient technique for solution of linear and nonlinear diffusion-dispersion models” in FIAM-2018 International Conference on Frontiers in Industrial and Applied Mathematics, NIT Hamirpur (H.P.) India from April 26-27, 2018.