REFERENCES

ABRAMOWITZ, Milton; STEGUN, Irene A. — Handbook of mathematical functions with formulas, graphs, and mathematical tables. [S.l.]: Dover Books, 1970.

Ahmed , Salim., Huang, Biao., Shah, Sirish. L.- " Novel identification method from step response", Journal of Control Engineering Practice Vol. 15, no. 5, pp. 545-556, 2007.

Åström, K. J. and Hägglund, T. "Automatic tuning of simple regulators with specifications on phase and amplitude margins." Automatica, 20, pp. 645– 651, 1984

Bhambhani, Varsha, Yang Quan Chen and Dingy¨u Xue, "Optimal Fractional Order Proportional Integral Controller for Varying Time Delay Systems", Proceedings of the 17th World Congress The International Federation of Automatic Control Seoul, Korea, pp.4910-4915, July 6-11, 2008

BAGLEY, Ronald L., TORVIK, Peter J. — Fractional calculus: a different approach to the analysis of viscoelastic damped structures. AIAA journal. 21:5 (1983) 741-748.

BARBOSA, Ramiro S.; MACHADO, J. A. Tenreiro; FERREIRA, Isabel M. — A fractional calculus perspective of PID tuning. In Proceedings of ASME 2003 design engineering technical conferences and Computers and information in engineering conference. Chicago: ASME, 2003.

BARBOSA, Ramiro S., MACHADO, J. A. Tenreiro., FERREIRA, Isabel M. — Tuning of PID controllers based on Bode's ideal transfer function. Nonlinear dynamics. 38 (2004a) 305-321.

BARBOSA, Ramiro S., MACHADO, J. A. Tenreiro., FERREIRA, Isabel M. — PID controller tuning using fractional calculus concepts. Fractional calculus & applied analysis. 7:2 (2004b) 119-134.

BENNET, Stuart — A brief history of automatic control. IEEE control systems. 16:3 (1996) 17-25.

BENOSMAN, M., BOYER, F., LE VEY, G. — Flexible links manipulators: from modeling to control. Journal of intelligent and robotic systems. 34 (2002) 381-414.

BENSON, David., TADJERAN, Charles., MEERSCHAERT, Mark M.., FARNHAM, Irene., POHLL, Greg — Radial fractional-order dispersion through fractured rock. Water resources research. 40 (2004) 1-9. http://www.maths.otago.ac.nz/~mcubed/ frade_wrr.pdf

Bettou . K., Charef, A. & Vinagre, B. M. A proposal for optimal tuning of fractional order proportional integral-proportional derivative $PI^{\lambda;}$-$PD^{\mu;}$ controllers. 2009 IEEE Conference on Emerging Technologies & Factory Automation(2009).

Bettou, K. & Charef, A. Control quality enhancement using fractional PIλD μ controller. International Journal of Systems Science, 40(8), 875–888(2009).

Bettou, K. & Charef, A. Parameter Tuning of Fractional PI^{α} -PD^{β} Controllers with Integral Performance Criterion, 1–6. (2010).

Bhambhani, Varsha. "Optimal Fractional Order Proportional And Integral Controller For Processes With Random Time Delays" (2009). *All Graduate Theses and Dissertations*. Paper 246. http://digitalcommons.usu.edu/etd/246

Bhaskaran, T., Chen, Y. Q. and Bohannan, G. "Practical tuning of fractional order proportional and integral controller: Experiments," presented at the ASME Conf., Las Vegas, NV, 2007, Sep. 4–7,

Bijoy, K. M. and Santanu M. "Fractional order modeling and GA based tuning for analog realization with lossy capacitors of a PID controller," Proc. Int. Multi Conf. of Engg. Comput. Sci., vol II, 2009.

Biswas, A., Das, S., Abraham, A. and Dasgupta, S., "Design of fractional- order $PI^{\lambda}D^{\mu}$ controllers with an improved differential evolution," Engineering Applications of Artificial Intelligence, 2009.

Bohannan, G. W. Analog realization of a fractional controller, revisited. In: BM Vinagre, YQ Chen,eds, Tutorial Workshop 2: Fractional Calculus Applications in Automatic Control and Robotics, Las Vegas, USA, 2002

CALDERÓN, A. J., VINAGRE, B. M. and FELIÚ, V. — Fractional sliding mode control of a DC-DC buck converter with application to DC motor drives. In Proceedings of the 11th international conference on advanced robotics. Coimbra: IEEE, 2003. p. 252-257.

CANDAN, Ç. and OZAKTAS, H. M. — Sampling and series expansion theorems for fractional Fourier and other transforms. Signal processing. 83 (2003) 2455-2457.

Cao, Jun-Yi., Liang, Jin., Cao, Bing-Gang. "Optimization of fractional order PID controllers based on genetic algorithms", Machine Learning and Cybernetics, 2005.

Cao, J. Design of Fractional Order Controllers Based on Particle Swarm Optimization, 1–6. doi:10.1109/ICIEA.2006.257091, (2006).

CAPONETTO, R., FORTUNA, L. and PORTO, D. — Parameter tuning of a non integer order PID controller. In Electronic proceedings of the fifteenth international symposium on mathematical theory of networks and systems. 2002. http://www.nd.edu/~mtns/ papers/7434.pdf

CAPONETTO, R., FORTUNA, L. and PORTO, D. — A new tuning strategy for a non integer order PID controller. In First IFAC workshop on fractional differentiation and its applications. Bordeaux: IFAC, 2004.

CARLSON, G. E. and HALIJAK, C. A. — Approximation of fractional capacitors $(1/s)^{1/n}$ by a regular Newton process. IEEE transactions on circuit theory. 7 (1964) 210-213.

Chareff, A., Sun, H., Tsao, Y.Y. and Onaral, B. Fractional system as represented by singularity function. IEEE Transactions on Automatic Control, 37(09):1465– 1470, 1992.

Chien, K.L., Hrones, J.A. & Reswick, J.B. On the automatic control of generalized passive systems Transaction of the ASME, Vol.74, No.2, (February 1952), pp. 175-185

CHEN, W. — A new definition of the fractional Laplacian. ArXiv Computer Science e- prints. 2002. http://arxiv.org/ftp/cs/papers/0209/0209020.pdf

CHEN, W. and HOLM, S. — Physical interpretation of fractional diffusion-wave equation via lossy media obeying frequency power law. ArXiv Mathematical Physics e-prints. 2003. http://arxiv.org/ftp/math-ph/papers/0303/0303040.pdf

CHEN, Y. Q. and VINAGRE, B. M. — A new IIR-type digital fractional order differentiator. Signal processing. 83 (2003) 2359-2365.

CHEN, Y. Q., MOORE, K. L. and VINAGRE, B. M. PODLUBNY, Igor — Robust PID controller autotuning with a phase shaper. In First IFAC workshop on fractional differentiation and its applications. Bordeaux: IFAC, 2004.

Chen, Y. Q, "Ubiquitous fractional order controls", Proceedings of the 2nd IFAC Workshop on Fractional Differentiation and its Applications, Vol. 2, 2002.

Chen, Y. Q., Hu C. H. and Moore, K. L., Relay feedback tuning of robust PID controllers with iso-damping property. In: Proceedings of the 42nd IEEE conference on decision and control, vol. 3, 2003. p. 2180-2185

Chen, Y.Q., Ahn, H.S. and Podlubny, I., Robust stability check of fractional order linear time invariant systems with interval uncertainties. Signal Processing, 2006, 86:2611–2618

Chen, Y. Q., Petras, I. and Xue, D. u. "Fractional Order Control - A Tutorial" 2009 American Control Conference, Hyatt Regency Riverfront, St. Louis, MO, USA, pp. 1397-1411, June 10-12, 2009.

Chenikher, S., Abdelmalek, S. and Sedraoui, M. "Control of uncertainly multi-variable system with fractional PID", Electrotechnical Conference (MELECON), 2012 16th IEEE Mediterranean, Issue Date: 25-28 March 2012

Cheng, Y. C. and Chyi, H. "Stabilization of unstable first order time-delay systems using fractional-order PD controllers", Journal of the Chinese Institute of Engineers, Vol. 29, No. 2, pp. 241-249, 2006.

Cohen, G.H. and Coon, G.A. Theoretical consideration of retarded control.Trans. ASME75, (1953). 827–834.

CHIPPERFIELD, A., FLEMING, P., POHLHEIM, H. and FONSECA, C. — Genetic algorithm toolbox for use with Matlab; version 1.2 user's guide. Sheffield: University of Sheffield, 1994.

COIS, O., LANUSSE, P., MELCHIOR, P., DANCLA, F. and OUSTALOUP, A. — Fractional systems toolbox for Matlab: applications in system identification and Crone CSD. In 41st IEEE conference on decision and control. Las Vegas: IEEE, 2002.

Cominos, P. and Munro, N. PID controllers: Recent tuning methods and design to specification. IEE Proceedings: Control Theory & Application 2002;149(1): 46-53

COOPER, G. and COWAN, D. — The application of fractional calculus to potential field data. Exploration geophysics. 34 (2003) 51-56.

Das, S., Das, S. and Gupta A.- "Fractional Order Modeling of a PHWR Under Step-Back Condition and Control of its Global Power with a Robust $PI^{\lambda}D^{\mu}$ controller", IEEE Transactions On Nuclear Science, Vol. 58, No. 5, pp. 2431-2441, October 2011.

Das, S., Saha, S., Das, S. and Gupta A. "On the selection of tuning methodology of FOPID controllers for the control of higher order processes", ISA Transactions, Vol. 50, Issue 3, pp. 376–388, 2011.

Das, S., Pan I., Das, S. and Gupta, A., "Improved model reduction and tuning of fractional-order PI controllers for analytical rule extraction with genetic programming, ISA Transactions, Vol. 51, Issue 2, pp. 237–261, 2012.

DAUPHIN, G. — Application des représentations diffusives au temps discret. Paris: École Nationale Supérieure des Télécomunications, 2001. Doctorate thesis.

Delavari, H., Ghaderi, R., Ranjbar, A. and Momani, S. "Fuzzy fractional order sliding mode controller for nonlinear systems", International Journal of Communications in Nonlinear Science and Numerical Simulation, Volume 15 ,Issue-4, Pages 963-978, 2010(Elsevier Publisher).

Debbarma, S. and Saikia, L. C., "Bacterial Foraging Based FOPID Controller in AGC of an Interconnected Two-Area Reheat Thermal System Under Deregulated Environment", IEEE - International Conference on Advances in Engineering, Science and Management (ICAESM-2012), pp. 303-308, March 30, 31, 2012.

Debbarma, S., Saikia, L.C. and Sinha, N. "AGC of a multi-area thermal system under deregulated environment using a non-integer controller," Electr. Power Syst. Res., Vol. 95, pp. 175–183, February 2013.

de Paula, C.F. and Ferreira, L.H.C. 'An improved analytical PID controller design for non-monotonic phase LTI systems', IEEE Transactions on Control Systems Technology, September, Vol. 20, No. 5, pp.1328–1333, 2012.

DEL-CASTILLO-NEGRETE, D., CARRERAS, B. A. and LYNCH, V. E. — Fractional diffusion in plasma turbulence. Physics of plasmas. 11:8 (2004) 3584.

DIAZ, J. B. and OSLER, T. J. — Differences of fractional order. Mathematics of computation. 28:125 (1974) 185-202.

Efe, M. Ö. "Fractional Order Systems in industrial Automation A Survey" , IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, VOL. 7, NO. 4, NOVEMBER 2011

FELLAH, Z. E. A., BERGER, S., LAURIKS, W. and DEPOLLIER, C. — Verification of Kramers-Kronig relationship in porous materials having a rigid frame. Journal of sound and vibration. 270 (2004) 865-885.

Feliu-Batlle, V., Rivas Perez, R. and Sanchez Rodrigue, L.- Fractional robust control of main irrigation canals with variable dynamic parameters. Control Eng. Pract. 15, 673– 686 (2007)

FERREIRA, N. M. F. and MACHADO, J. A. T. — Fractional-order hybrid control of robotic manipulators. In Proceedings of the 11th international conference on advanced robotics. Coimbra: IEEE, 2003. p. 393-398.

GARCÍA-FINÃNA, Marta. and CRUZ-ORIVE, Luis M. — Fractional trend of the variance in Cavalieri sampling. Image analysis and stereology. 19:2 (2000) 71-79. http://www.general.monash.edu.au/ss/pdf/vol19no2/Garcia_Finana_001.pdf

Garcia, D., Karimi, A., Longchamp, R. and Dormido, S., PID controller design with constraints on sensitivity functions using loop slope adjustment. In: Proceedings of the 2006 American control conference minneapolis, 2006.

GOODWIN, G. C., GRAEBE, S. F. and SALGADO, M. E. — Control system design. Upper Saddle River: Prentice Hall, 2001.

GORENFLO, R., MAINARDI, F., RABERTO, M. and SCALAS, E. — Fractional diffusion in finance: basic theory. In Modelli dinamici in economia e finanza. Urbino: MDF, 2000. http://www.econ.uniurb.it/bischi/MDEF2000/ MainardiMDEF.pdf

GORENFLO, R. and VIVOLI, A. — Fully discrete random walks for space- time fractional diffusion equations. Signal processing. 83 (2003) 2411-2420.

GRADSHTEYN, I. S., RYZHIK, I. M. and JEFFREY, A. — Table of integrals, series and products. Boston: Academic Press, 1980.

Guichao Hua and Fred C. Lee, "Soft Switching Techniques in PWM Converters", IEEE Trans. Industrial Electronics, Vol. 42, No. 6, pp. 595-603, 1995.

Gyongy I.J. and Clarke D.W. – "On the automatic tuning and adaptation of PID controllers", Journal of control engineering practice, Vol. 14, 2006, pp. 149-163.

HÄGGLUND, T. and ÅSTRÖM, K. J. — Automatic tuning of PID controllers. In LEVINE, William S. — The control handbook. Boca Raton: CRC Press, 1996, p. 817-826.

Hamamci, S. E. and N. Tan. "Design of PI controllers for achieving time and frequency domain specifications simultaneously," ISA Transactions, Vol. 45, No. 4, pp. 529-543, 2006.

HARTLEY, T. T. and LORENZO, C. F. — Fractional-order system identification based on continuous order-distributions. Signal processing. 83 (2003) 2287-2300.

HELMICKI, A. J., JACOBSON, C. A. and NETT, C. N. — Control oriented system identification: a worst-case / deterministic approach in H_∞. IEEE transactions on automatic control. 36:10 (1991) 1163-1176.

Herman L.N. Wiegman, "A Resonant Pulse Gate Drive for High Frequency Applications", IEEE Applied Power Electronics Conference, pp. 738-743, 1992.

HERRMANN, F. — Quantitative tools for seismic stratigraphy and lithology characterization. In Annual report of the industry consortia of Earth Resources Laboratory. Cambridge: Massachussets Institute of Technology, 2001. http://www.eos.ubc.ca/~felix/Preprint/herrmann.pdf

HILDEBRAND, F. B. — Advanced calculus for applications. Englewood Cliffs: Prentice-Hall, 1976.

Ho, W.K., Hang, C.C. and Cao, L.S.. Tuning of PID controllers based on gain and phase margin specifications,Automatica, 31, 1995, pp. 497–502.

Hougen, J.O. - Measurement and Control Applications (Instrument Society of America, North Carolina), 1979.

Indranil P. and Das, S. - Chaotic multi-objective optimization based design of fractional order $PI^{\lambda}D^{\mu}$ controller in AVR system.

International Rectifier, “Synchronous PWM controller for termination power supply applications,” 2nd Ed., 2002

JANG, J.-S. R. — Derivative-free optimization. In JANG, J.-S. R.; SUN, C.-T.; MIZUTANI E. — Neuro-fuzzy and soft computing. Upper Saddle River: Prentice Hall, 1997, p. 173-196.

Jianhong, Z., Jianping, Y. and Qingyou, Z. “A Novel DC/DC ZVS Converter for Battery Input Application”, IEEE Applied Power Electronics Conference, pp. 892-896, 2002.

Karimi, A., Garcia, D. and Longchamp, R. PID controller design using Bode's integrals. Proceedings of the American Control Conference 2002;6(8-10):5007-5012.

Karimi, A., Garcia, D. and Longchamp R., PID controller tuning using Bode's integrals. IEEE Transactions on Control Systems Technology 2003; 11(6):812-821

Kaya, I. A PI-PD controller design for control of unstable and integrating processes, ISA Transactions, 42, 2003, pp.111-121.

Kesarkar, A.A. and Selvaganesan, N. ‘Tuning of robust PI^{α}/PD^{β} controller for generalized plant structure’, International Conference on Recent Advancement in Electrical, Electronics and Control Engineering, 2011.

KLEINZ, M. and OSLER, T. J. — A child’s garden of fractional derivatives. The college mathematics journal. 31:2 (2000) 82-88.

Khalid, R., Wenkai, W., Weihong, Q. and Issa, B.- “Asymmetric Half Bridge Soft Switching PFC Converter with Direct Energy Transfer”, IEEE Conf., pp. 676-681, 2002.

KHATIB, O. — A unified approach for motion and force control of robot manipulators : the operations space formulation. IEEE journal of Robotics and Automation. RA-3 :1 (1987) 43-53.

LAGARIAS, J.C., REEDS, J. A., WRIGHT, M. H. and WRIGHT, P. E. — Convergence properties of the Nelder-Mead simplex method in low dimensions. SIAM journal of optimization. 9:1 (1998) 112-147.

LANDAU, I. D., REY, D., KARIMI, A., VODA, A. and FRANCO, A. — A flexible transmission system as a benchmark for robust digital control. European journal of control. 1 (1995) 77-96.

LANUSSE, P., POINOT, T., COIS, O., OUSTALOUP, A. and TRIGEASSOU, J. C. — Tuning of an active suspension system using a fractional controller and a closed-loop tuning. In Proceedings of the 11th international conference on advanced robotics. Coimbra: IEEE, 2003. 258-263.

LAVOIE, J. L., OSLER, T. J. and TREMBLAY, R. — Fractional derivatives and special functions. SIAM review. 18:2 (1976) 240-268.

LAWRENCE, P. J., ROGERS, G. J. — Sequential transfer-function synthesis from measured data. Proceedings of the IEE. 126:1 (1979) 104-106.

Leu, J.F., Tsay, S.Y., Hwang, C. “Design of optimal fractional-order PID controllers”, Journal of the Chinese Institute of Chemical Engineers, 2002, 33(2):193–202

Leva, A., Model-based proportional-integral-derivative auto tuning improved with relay feedback identification, IEE Proceedings-Control Theory and Applications, 152, 2005, pp.247-256.

LEVY, E. — Complex curve fitting. IRE transactions on automatic control. 4 (1959) 37-43.

Lin, B.R. “Analysis of neural and fuzzy power electronic control”, IEEE Proc. on Science and Tech., Vol. 144, No. 1, pp. 25-33, 1997.

LORENZO, Carl F., HARTLEY, T. T. — Initialization in fractional order systems. In Proceedings of the European control conference. Porto: EUCA, 2001. p. 1471-1476.

LOVERRO, A. — Fractional calculus: history, definitions and applications for the engineer. 2004. http://www.nd.edu/~msen/Teaching/UnderRes/FracCalc.pdf

LU, S., MOLZ, F. J., FIX, G. J. — Possible problems of scale dependency in applications of the three-dimensional fractional advection-dispersion equation to natural porous media. Water resources research. 38:9 (2002) 1-9. http://www.geotransinc.com/publications/Possible_problems_of_scale.pdf

LUBLIN, L., GROCOTT, S., ATHANS, M. — H_2 (LQG) and H_∞ control. In LEVINE, William S. — The control handbook. Boca Raton: CRC Press, 1996, p. 651-661.

Luo, Y. and Chen Y. Q., “Stabilizing and Robust FOPI Controller Synthesis for First Order Plus Time Delay Systems”, 50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC), Orlando, FL, USA, pp. 2040–2045, December 12-15, 2011.

Luo, Y. and Chen Y. Q,, “Fractional-order [Proportional Derivative] Controller for Robust Motion Control: Tuning Procedure and Validation”, American Control Conference Hyatt Regency Riverfront, St. Louis, MO, USA, pp. 1412-1417, June 10-12, 2009.

Luo, Y., Wang C. Y. and Chen Y. Q. “Tuning fractional order proportional integral controllers for fractional order systems”, Control and Decision Conference. Components, Circuits, Devices and Systems; Computing and Processing (Hardware/Software); Robotics and Control Systems, CCDC '09, China, pp.307-312, 2009.

Luo, Y., Chen, Y. Q., Wang, C. Y. and Pi, Y. G. “Tuning of fractional order proportional integral controllers for fractional order systems”, Elsevier-Journal Of Process Control, pp.823-831, April 2010.

Luo, Y., Chen, Y. Q., Wang, C. Y. and Pi, Y. G. “Tuning fractional order proportional integral controllers for fractional order systems”, Journal of Process Control 20, Issue 7, pp. 823–831, 2010.

MACHADO, J. A. T. — Analysis and design of fractional-order digital control systems. Journal of systems analysis, modeling and simulation. 27 (1997) 107-122.

MACHADO, J. A. T. and AZENHA, A. — Fractional-order hybrid control of robot manipulators. In 1998 IEEE international conference on systems, man and cybernetics: intelligent systems for humans in a cyberworld. [S.l.]: IEEE, 1998. p. 788-793.

MACHADO, J. A. T. — On the implementation of fractional-order control systems through discrete-time algorithms. In Bánki Donát Polytechnic műszaki főiskola: jubilee international conference proceedings. Bánki Donát: Bánki Donát Polytechnic, 1999. p. 39-44.

MACHADO, J. A. T. — Discrete-time fractional-order controllers. Fractional calculus & applied analysis. 4:1 (2001) 47-66.

MACHADO, J. A. T. — A probabilistic interpretation of the fractional-order differentiation. Fractional calculus & applied analysis. 6:1 (2003) 73-80.

Macias, M. and Sierociuk, D. Fractional order calculus for modelling and fractional PID control of the heating process.. In Proc. 13th Int. Carpathian Control Conference (ICCC 2012),

MALTI, R., AOUN, M., COIS, O., OUSTALOUP, A., LEVRON, F. — H_2 norm of fractional differential systems. In Proceedings of ASME 2003 design engineering technical conferences and Computers and information in engineering conference. Chicago: ASME, 2003.

Maia, N.M.M., Silva, J.M.M, Ribeiro, A.M.R. On A General Model For Damping, Journal of Sound and Vibration, Volume 218, Issue 5, 17 December 1998, Pages 749–767.

Maiti, D., Acharya, A., Chakraborty, M., Konar, A., Janarthanan, R.: 'Tuning PID and $PI^{\lambda}D^{\mu}$ controllers using the integral time absolute error criterion'. Information and Automation for Sustainability, Colombo, 2008

Manabe, S. "The non-integer integral and its application to control systems", Japanese Institute of Electrical Engineers Journal, 1961, 6(3-4):83–87

Marcelo, L. H., de Souza, A. F. and Barbi, Ivo. "A Primary Side Clamping Circuit Applied to the ZVS PWM Asymmetrical Half Bridge Converter", Annual Power Electronics Specialists Conf., pp. 199-204, 2000.

Mariodi, B., Franco, G., Luigi, G. and Francesco, V. "Switchings, Bifurcations, and Chaos in DC-DC Converters", IEEE Trans. on Circuits and Systems-I, Vol. 45, No. 2, pp. 133-141, 1998.

MARTINS, J. M. M. — Modeling and identification of flexible manipulators towards robust control. Lisboa: Universidade Técnica de Lisboa, 2000. Masters thesis.

MATHIEU, B., MELCHIOR, P., OUSTALOUP, A., CEYRAL, Ch. — Fractional differentiation for edge detection. Signal processing. 83 (2003) 2421-2432.

MATSUDA, K. and FUJII, H. — H_∞ optimized wave-absorbing control: analytical and experimental results. Journal of guidance, control and dynamics. 16:6 (1993) 1146-1153.

MILLER, K. S. and ROSS, B. — An introduction to the fractional calculus and fractional differential equations. New York: John Wiley and Sons, 1993.

Monje, C.A., Calderon, A.J., Vinagre, B.M., "PI vs. fractional DI control: first results", Proceedings of the CONTROLO 2002: 5th Portuguese Conference on Automatic Control. Aveiro, Portugal, 2002, 359–364

MONJE, C. A., VINAGRE, B. M., CHEN, Y. Q., FELIU, V., LANUSSE, P., SABATIER, J. — Proposals for fractional $PI^{\lambda}D^{\mu}$ tuning. In First IFAC workshop on fractional differentiation and its applications. Bordeaux: IFAC, 2004.

Monje, C.A., Calderon, A.J., Vinagre B.M.- The fractional order lead compensator. Proceedings of the IEEE International Conference on Computational Cybernetics. Vienna, Austria, 2004, 347–352

Monje, C.A., Calderon, A.J., Vinagre B.M. - Auto-tuning of fractional lead-lag compensators. Proceedings of the 16th IFAC World Congress, Prague, Czech Republic, 2005

Monje, C.A., Vinagre, B.L., Feliu, V. and Chen, Y.Q. 'Tuning and autotuning of fractional order controllers for industry applications', Control Engineering Practice, Vol. 16, No. 7, pp.798–812. 2008.

Monje, C.A., Vinagre, B.L., Chen, Y.Q., Feliu, V., Patrick, L. and Sabatier, J. 'Optimal tunings for fractional $PI^{\lambda}D^{\mu}$ controllers', Fractional Differentiation and its Applications, pp.675–686, UBooks, Augsburg, Germany, 2009.

MORARI, M. and ZAFIRIOU, E. — Robust process control. London: Prentice Hall, 1999.

Mor, M. P. and Shmuel, B. Y. "Time domain design of digital compensators for PWM DC-DC converters", IEEE Trans. on Power Electronics, Vol. 27, No. 1, pp. 284-293, 2012.

NABAIS, J. M. L. C. — Controlo por modo de deslizamento de um robô flexível. Lisboa: Universidade Técnica de Lisboa, 2002. Masters thesis.

Narang, A., Sirish, L. Shah. and Chen T, " Tuning of fractional PI controllers for fractional order system models with and without time delays"American Control Conference Marriott Waterfront, Baltimore, MD, USA June 30-July 02, 2010.

Nataraj P. S. V.- Tharewal S., "On Fractional Order QFT Controllers", Journal of dynamic systems, measurement, and control, Volume 129 ,Issue-2, Pages 212-218, 2007.

NIGMATULLIN, R. R., LE, M., Oustaloup, A. — The geometrical and physical meaning of the fractional integral with complex exponent. International journal of science georesources. 1:8 (2004) 2-9.

OGATA, K. — Modern control engineering. London: Prentice Hall International, 2009

Oldham,K. B. and Spanier, J.- The Fractional Calculus. New York: Academic Press, 1974

ORTIGUEIRA, M. D. — Introduction to fractional linear systems II: discrete- time case. IEE proceedings — vision, image and signal processing. 147:1 (2000) 71-78. http://www2.uninova.pt/~mdortigueira/publ_files/fls_iee_d.pdf

ORTIGUEIRA, M. D., MATOS, C. J. C. — New results on fractional linear prediction. Initialization in fractional order systems. In Proceedings of the European control conference. Porto: EUCA, 2001.

ORTIGUEIRA, M. D. — On the initial conditions in continuous-time fractional linear systems. Signal processing. 83 (2003) 2301-2309.

ORTIGUEIRA, M. D., MACHADO, J. A. T., SÁ DA COSTA, José — Which differintegration? IEE proceedings vision, Image & signal processing. 2005. Accepted for publication.

Oustaloup, Alain. Linear feedback control systems of fractional order between 1 and 2. Proc. of the IEEE Symposium on Circuit and Systems. Chicago, USA, 1981, OUSTALOUP, Alain — La commande CRONE: commande robuste d'ordre non entier. Paris: Hermès, 1991.

OUSTALOUP, Alain; MATHIEU, B.; LANUSSE, P. — The CRONE control of resonant plants: application to a flexible transmission. European journal of control. 1 (1995) 113-121.

Oustaloup, A., Mathieu, B. La Commande CRONE: du Scalaire au Multivariable. Paris: Herm`es, 1999.

OUSTALOUP, A., LEVRON, F., MATHIEU, B., NANOT, F. M. — Frequency-band complex noninteger differentiator: characterization and synthesis. IEEE transactions on circuits and systems I: Fundamental theory and applications. 47:1 (2000) 25-39.

Oustaloup, A., Levron, F., Nanot, F. -- Frequency band complex non integer differentiator : characterization and synthesis. IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications, 2000, 47(1):25–40

OUSTALOUP, A., MELCHIOR, P., LANUSSE, P., COIS, O., DANCLA, F. — The CRONE toolbox for Matlab. In 41st IEEE conference on Decision and Control. Las Vegas: IEEE, 2002.

OUSTALOUP, A., ORSONI, B., MELCHIOR, P., LINARÈS, H. — Path planning by fractional differentiation. Robotica. 21 (2003) 59-69.

Padula, F. and Visioli. A."Tuning rules for optimal PID and fractional-order PID controllers" Journal of Process Control, vol. 21, pp. 69-81, 2011.

Panda, R.C. and Yu, C.C. "Analytical expressions for relay feedback responses", Journal of Process Control, Vol. 13, pp. 489 – 501, 2003.

Panda, R.C. "Synthesis of PID controller for unstable and integrating processes", Chemical Engineering Science, Vol. 64, pp. 2807–2816,2009.

Peng, Xu., Yuan, C. R., Mao, Ye. and Fred, C. L. "A Family of Novel Interleaved DC/DC Converters for Low Voltage High Current Voltage Regulator Module Applications", IEEE Conference, pp. 1507-1511, 2001.

Petráš, I., Dor ák . and Koštial, I. - Control quality enhancement by fractional-order controllers, Acta Montanistica Slovaca, Vol. 2, No. 2,pp. 143–148, 1998.

Petras, I. "The Fractional Order Controllers: Methods for Their Synthesis and Application", Journal of Electrical Engineering, Vol. 50, No. 9-10, pp. 284–288, July 1999.

PETRAS, I. and HYPIUSOVA, M. — Design of fractional-order controllers via H_∞ norm minimisation. In MIKLES, J.; VESELY, V. — Selected topics in modelling and control. Bratislava: Slovak University of Technology Press, 2002a. vol. 3, p. 50-54.

Petr´aˇs I., Podlubny, I., Leary, P. O. -Analogue Realization of Fractional Order Controllers. Fakulta BERG, TU Koˇsice, 2002.

PETRÁŠ, Ivo., VINAGRE, Blas M. — Practical application of digital fractional-order controller to temperature control. Acta montanistica slovaca. 7:2 (2002b) 131-137 http://actamont.tuke.sk/pdf/2002/n2/11petras.pdf

PETRÁŠ, Ivo., VINAGRE, Blas M., DORČÁK, L'., FELIU, V. — Fractional digital control of a heat solid: experimental results. In International carpathian control conference. Malenovice: ICCC, 2002. 365-370. http://www.icc-conf.cz/Conference/ICCC2002/Proceedings/papers/365.pdf

Philips, C.L. and Harbor, R.D. (1999) Feedback Control Systems, Prentice-Hall, Englewood Cliffs, NJ.

Pit, L. W., Peng Xu, B. Y. and Fred C. L. "Performance Improvements of Interleaving VRMs with Coupling Inductors", IEEE Trans. on Power Electronics, Vol. 16, No. 4, pp. 499-507, 2001.

Podlubny, I. "The Laplace Transform Method for the Linear Differential Equations of the Fractional Order," The Academy of Sciences Institute of Experimental Physics, 1994

PODLUBNY, I. — Fractional differential equations: an introduction to fractional derivatives, fractional differential equations, to methods of their solution and some of their applications. San Diego: Academic Press, 1999.

Podlubny, I., Petras, I., Vinagre B.M., O'Leary, P., Dorcak, L'., -Analogue realizations of fractional-order controllers. Nonlinear Dynamics 2002;29(July):281-296.

Polonyi, M.J.G.. PID controller tuning using standard form optimization,Control Engineering, March, 1989, pp. 102–106.

POMMIER, Valérie; MUSSET, Roland; LANUSSE, Patrick; OUSTALOUP, Alain — Study of two robust controls for an [sic] hydraulic actuator. In Proceedings of the European Control Conference. Cambridge: EUCA, 2003.

Poon, N.K. and Pong, M.H. "A Novel ZVS Direct Coupling Converter", IEEE Conference, pp. 94-99, 1996.

PRESS, William H., TEUKOLSKY, Saul A., VETTERLING, William T., FLANNERY, Brian P. — Numerical recipes in C — the art of scientific computing. 2nd edition. Cambridge: Cambridge University Press, 1992. http://www.library.cornell.edu/nr/cbookcpdf.html

RADOK, Rainer — Continued fractions. 199[9?]. http://mpec.sc.mahidol.ac.th/numer/step1aa.htm

Rais, Miftakhutdinov, Alexey, Nemchinov, Valery, Meleshin and Simon, Fraidlin, "Modified asymmetrical ZVS half bridge DC-DC converter", IEEE Conference, pp. 567-574, 1999.

Robert, W., Fred, C. L. and Guichao, C. H. "Utilization of an Active Clamp Circuit to achieve Soft Switching in Flyback Converters", IEEE Trans. on Power Electronics, Vol. 11, No. 1, pp. 162-169, 1996.

Ross, B. Editor, "Fractional Calculus and its Applications", Springer Verlag, Berlin, 1975.

SABATIER, Jocelyn., MELCHIOR, Pierre., OUSTALOUP, Alain — Réalisation d'un banc d'essais thermique pour l'enseignement des systèmes non entiers. In Colloque sur l'enseignement des technologies et des sciences de l'information et des systèmes. Toulouse: Université Paul Sabatier, 2003. p. 361-364.

Saha, Suman., , Dasa, Saptarshi., Ghosh, Ratna., Goswami, Bhaswati., Balasubramanian, R., Chandra, A.K., Das, Shantanu. and Gupta, Amitava - "Fractional order phase shaper design with Bode's integral for iso-damped control system", ISA Transactions, Vol. 49, Issue 2, pp.196-206, 2010.

SAMKO, Stefan G., KILBAS, Anatoly A., MARICHEV, Oleg I. — Fractional integrals and derivatives: theory and applications. Yverdon: Gordon and Breach Science Publishers, 1993. Reviewed and improved translation of:

SANATHANAN, C. K., KOERNER, J. — Transfer function synthesis as a ratio of two complex polynomials. IEEE transactions on automatic control. 8 (1963) 56-58.

Schaedel, H. M. - A New method of direct PID controller design based on the principle of cascade damping ratios, Proceedings of the European Control Conference (Brussels,Belgium), .(1997).PaperWE-AH4.

SCHOUKENS, J., PINTELON, R., RENNEBOOG, J. — A maximum likelihood estimator for linear and nonlinear systems—a practical application of estimation techniques in measurement problems. IEEE transactions on instrumentation and measurement. 37:1 (1988) 10-17.

SILVA, C. A., SOUSA, J. M., RUNKLER, T., SÁ DA COSTA, J. — A logistic process scheduling problem: genetic algorithms or ant colony optimization? in IFAC Congress. 2005. Accepted for presentation.

Skoczowski, S. and Tarasiejski, L., Tuning ofPID controllers based on gain and phase margin specifications usingStrejc's process model with time delay, Proceedings of the Third International Symposium on Methods and Models in Automation and Robotics (MMAR '96),Miedzyzdroje, Poland, 1996, pp. 765-770.

Skogestad, S. and Postlethwaite, I. Multivariable Feedback Control: Analysis and Design, Wiley, New York, 2005.

STANISLAVSKY, A. A. — Probability interpretation of the integral of fractional order. Theoretical and mathematical Physics. 138:3 (2004) 418-431.

SUÁREZ, J. I., VINAGRE, B. M., CHEN, Y. Q. — Spatial path tracking of na autonomous industrial vehicle using fractional order controllers. In Proceedings of the 11th international conference on advanced robotics. Coimbra: IEEE, 2003. p. 405-410.

Sun, H.H., Abdelwahab, A.A. and Onaral, B., "Linear approximation of transfer function with a pole of fractional order", IEEE Transactions on Automatic Control, Vol. 29, Issue 5, pp. 441–444, 1984.

Sundaresan, K.R. and Krishnaswamy, P.R., "Estimation of time delay, time constant parameters in time, frequency and Laplace domains", Canadian Journal of Chemical Engineering., Vol. 56, pp.257 – 262, 1978.

Sung, S. W., Lee, I. B. and Lee, B.K., "On line process identification and automatic tuning method for PID controllers", Chemical Engineering Science., Vol. 53, pp. 1847 – 1859, 1998.

TAJAHUERCE, Enrique., SAAVEDRA, Genaro., FURLAN, Walter D., SICRE, Enrique E., ANDRÉS, Pedro. — White-light optical implementation of the fractional Fourier transform with adjustable order control. Applied optics. 39:2 (2000) 238-245.

Teukolsky, W.H., Vetterling, S.A. -'Numerical recipes in C – the art of scientific computing' (Cambridge University Press, Cambridge, 1992)

Trevor, A. Smith., Sima, Dimitrijev. and Barry Harrison, H. "Controlling a DC-DC Converter by Using the Power MOSFET as a Voltage Controlled Resistor", IEEE Trans. on Circuits and Systems-I: Fundamental Theory and Appli., Vol. 47, No. 3, pp. 357-362, 2000.

Tsao, Y.Y., Onaral, B. and Sun, H.H., "An algorithm for determining global parameters of minimum-phase systems with fractional power spectra", IEEE Transactions on Instrumentation and Measurement, Vol. 38, issue 3, pp. 723–729, 1989.

TSENG, Chien.Cheng., — Design of fractional order digital FIR differentiators. IEEE signal processing letters. 8:3 (2001) 77-79.

UNSER, Michael; BLU, Thierry — Fractional splines and wavelets. SIAM review. 42:1 (2000) 43-67.

VALÉRIO, Duarte — Fractional order robust control: an application. In Student Forum. Porto: EUCA, 2001a. p. 25-28.

VALÉRIO, Duarte Pedro Mata de Oliveira — Controlo robusto de ordem não inteira: síntese em frequência. Lisboa: Instituto Superior Técnico da Universidade Técnica de Lisboa, 2001b. Master's thesis.

VALÉRIO, Duarte; SÁ DA COSTA, José — Time domain implementations of fractional order controllers. In Controlo 2002. Aveiro: 5th Portuguese Conference on Automatic Control, 2002. p. 353-358.

VALÉRIO, Duarte., SÁ DA COSTA, José — Digital implementation of fractional control and its application to a two-link robotic arm. In Proceedings of the European control conference. Cambridge: EUCA, 2003a.

VALÉRIO, Duarte., SÁ DA COSTA, José — Optimisation of fractional order control parameters for a robotic arm. In Proceedings of the 11th international conference on advanced robotics. Coimbra: IEEE, 2003b. p. 393-398.

VALÉRIO, Duarte., SÁ DA COSTA, José — A method for identifying digital models and its application to non-integer order control. In Controlo 2004. Faro: 6th Portuguese Conference on Automatic Control, 2004a.

VALÉRIO, Duarte., SÁ DA COSTA, José — Ninteger: a non-integer control toolbox for Matlab. In First IFAC workshop on fractional differentiation and its applications. Bordeaux: IFAC, 2004b.

VALÉRIO, Duarte., SÁ DA COSTA, José — Non-integer control of a flexible robot. In First IFAC workshop on fractional differentiation and its applications. Bordeaux: IFAC, 2004c.

VALÉRIO, Duarte Pedro Mata de Oliveira — Ninteger v. 2.3: fractional control toolbox for MatLab. 2005. http://www.gcar.dem.ist.utl.pt/pessoal/dvalerio/ninteger/ manual.pdf

VALÉRIO, Duarte., SÁ DA COSTA, José — Time-domain implementation of fractional order controllers. IEE proceedings: control theory & applications. 2005a. Accepted for publication.

VALÉRIO, Duarte., SÁ DA COSTA, José — Levy's identification method extended to commensurate fractional order transfer functions. In Fifth EUROMECH Nonlinear Dynamics conference. Eindhoven: EUROMECH, 2005b.

VALÉRIO, Duarte., SÁ DA COSTA, José — Ziegler-Nichols type tuning rules for fractional PID controllers. In Proceedings of ASME 2005 design engineering technical conferences and Computers and information in engineering conference. Long Beach: ASME, 2005c.

VALÉRIO, Duarte., SÁ DA COSTA, José — Fractional control of a flexible robot. In LE MEHAUTE, Alain; MACHADO, J. A. Tenreiro; TRIGEASSOU, Jean Claude; SABATIER, Jocelyn — Fractional differentiation and its applications. Bordeaux: LAPS, 2005d. Accepted for publication.

VALÉRIO, Duarte., SÁ DA COSTA, José — Tuning of fractional controllers minimising H_2 and H_∞ norms. Acta polytechnica hungarica. 2005e. Submitted for publication.

VALÉRIO, Duarte., SÁ DA COSTA, José — Tuning of fractional PID controllers with Ziegler-Nichols type rules. Signal processing. 2005f. Submitted for publication.

Vale´rio, D. and Sa`da Costa, J. "Introduction to single-input, single output fractional control", IET Control Theory and Applications, Vol. 5, Issue 8, pp. 1033–1057, 2011.

Vinagre, B.M., Podlubny, I., Dorˇc´ L., "On fractional PID controllers: a frequency domain approach". Proceedings of the IFAC Workshop on Digital Control. Past, Present and Future of PID Control. Terrasa, Spain, 2000, 53–58

VINAGRE, B. M.,PODLUBNY, I., HERNÁNDEZ, A., FELIU, V. — Some approximations of fractional order operators used in control theory and applications. Fractional calculus & applied analysis. 3 (2000) 231-248.

VINAGRE JARA, Blas Manuel — Modelado y control de sistemas dinámicos caracterizados por ecuaciones íntegro-diferenciales de orden fraccional. Madrid: Universidad Nacional de Educación a Distancia, 2001. Doctorate thesis.

VINAGRE, B. M., PETRAS, I., MERCHAN, P., DORCAK, L. — Two digital realizations of fractional controllers: application to temperature control of a solid. In Proceedings of the European control conference. Porto: EUCA, 2001. p. 1764-1767.

Vinagre, B.M., Podlubny, I., - Hernandez, A and Feliu, V,. "Some approximations of fractional order operators used in control theory and applications", 41st IEEE Conference on Decision and Control, 2002.

Vinagre, B. M., Monje, C. A., Caldesron A. J., Suarez J., Fractional PID controllers for industry applications. A brief introduction. Journal of Vibration an Control 2007;13(9-10):1419-1429

Vrancic, D. and Peng, Y., Amplitude and phase margin setting with on-line PI controller, Proceedings of the CESA '96 IMACS multi conference symposium on control, optimization and supervision, Lille, France, Vol. 2, 1996, pp. 809-813.

Vijayan, V. and Rames C. Panda, "Design of PID controllers in double feedback loops for SISO systems with set-point filters", ISA Transactions, Vol. 51(4), pp. 514–521, 2012.

WALL, H. S. — Analytic theory of continued fractions. Princeton: D. Van Nostrand Company, 1948.

Wang, C., & Chen, Y. An Analytical Design of Fractional Order Proportional Integral and [Proportional Integral] Controllers for Robust Velocity Servo, (1), 3448–3453,(2009).

WANG, J., BRAS, R. L. — Ground heat flux estimated from surface soil temperature. Journal of hydrology. 216 (1999) 214-226.

Wang,Y.-G.and Shao,H..H, Optimal tuning for PI controller, Automatica,36, pp.147-152 .2000.

Wang,Y.-G.andCai,W.-J, PID tuning for integrating processes with sensitivity specifications, proceddings of the IEEE conference on Decision and Control (Orlando, Florida, U.S.A) 2001, pp 4087-4091
.

WHEELER, Nicholas — Construction and physical application of the fractional calculus. Reeds College Physics Seminar, March 5, 1997. Unpublished.

WIDDER, David V. — Advanced calculus. NewYork: Prentice-Hall, 1947.

Xue, D. and Chen, Y. “A Comparative Introduction of Four Fractional Order Controllers”, in Proc. of The 4th IEEE World Congress on Intelligent Control and Automation (WCICA02), IEEE, pp. 3228–3235, Shanghai, China, June 2002.

Xue, D., Zhao, C. N. and Chen, Y. Q. “Fractional Order PID Control of a DC-motor with an Elastic Shaft: A Case Study,” in Proceedings of American Control Conference, Minneapolis, Minnesota, USA, pp. 3182–3187, 2006.

Yeroglu, C. and Tan, N. “Note on fractional-order proportional– integral– differential controller design”, IET Control Theory and Applications, Vol. 5, Issue 17, pp. 1978–1989, 2011.

Zhao, C.N.. Xue, D.Y. Chen, Y. Q. “A fractional order PID tuning algorithm for a class of fractional order plants” Proceedings of the International Conference on Mechatronics and Automation. Niagara, Canada, 2005, 216–221

Zhao Chunna, The application of fractional order PID controller to position servomechanism, Intelligent Control and Automation, 2008. WCICA 2008. 7th World Congress on 25-27 June 2008.

Zhang, B.T. and Pi, Y. “Robust fractional order proportion-plus- differential controller based on fuzzy inference for permanent magnet synchronous motor”, IET Control Theory and Applications, Vol. 6, Issue 6, pp. 829–837, 2012.

Zhang, W., Xi, Y.,Yang, G.and Xu,X.Design PID controllers for desired time domain or frequency-domain response, ISA Transactions,41, .2002, pp.511-520.

Zhe Zhang, Ole C. Thomsen and Michael A.E. Andersen, “Optimal Design of a Push Pull Forward Half Bridge Bidirectional DC-DC Converter with Variable Input Voltage”, IEEE Trans. on Industrial Electronics, Vol. 59, No. 7, pp. 2761-2771, 2012.

ZIEGLER, J. G., NICHOLS, N. B. — Optimum settings for automatic controllers. Transactions of the ASME. 64 (1942) 759-768.

APPENDIX

LAPLACE TRANSFORMS INVOLVING FRACTIONAL AND IRRATIONAL OPERATIONS

For integer order systems, Laplace transform and its inverse plays a vital role. In this appendix, the definition is given first. Later some of the essential special functions are presented. Finally, an inverse Laplace transform table involving fractional and irrational-order operators is given.

A.1 Laplace Transforms

For a time-domain function f (t), its Laplace transform, in s-domain, is defined as

$$L\left[f(t)\right]=\int_{0}^{\infty} f(t)e^{-st}dt=F(s)$$

Where $L\ [f(t)]$ is the notation of Laplace transform.

If the Laplace transform of a signal f (t) is F (s), the inverse Laplace transform of F(s) is defined as

$$f(t)=L^{-1}\left[F(s)\right] = \frac{1}{j2\pi}\int_{\sigma-j\infty}^{\sigma+j\infty} F(s)e^{st}ds,$$

Where σ is greater than the real part of all the poles of function *F(s)*

Special Functions for Laplace Transform

Since the implementation of some fractional order operators is difficult, special functions may be needed. Here some of the special functions are introduced and listed in Table (…)

Laplace Transform Tables

An inverse Laplace transform table involving fractional and irrational operators is collected in TableA.2 [86,300]

Special Functions	**Definitions**
Mittag-Leffler	$\varepsilon_{\alpha,\beta}^{\gamma}=\sum_{k=0}^{\infty}\frac{(\gamma)_k}{\Gamma(\alpha\,\mathrm{k}+\beta)}\frac{z^k}{k!},\varepsilon_{\alpha,\beta}(\mathrm{z})=\varepsilon_{\alpha,\beta}^{1}(\mathrm{z}),\varepsilon_{\alpha}(\mathrm{z})=\varepsilon_{\alpha,1}(\mathrm{z})$
Dawson function	$daw(\mathrm{t})=\mathrm{e}^{-t^2}\int_0^t \mathrm{e}^{\tau^2}d\tau$
erf function	$erf(\mathrm{t})=\frac{2}{\sqrt{\pi}}\int_0^t e^{-\tau^2}d\tau$
erfc function	$erfc(\mathrm{t})=\frac{2}{\sqrt{\pi}}\int_t^{\infty} e^{-\tau^2}d\tau=1-erf(\mathrm{t})$
Hermit polynomial	$H_n(\mathrm{t})=\mathrm{e}^{t^2}\frac{d^n}{dt^n}\mathrm{e}^{-t^2}$
Bessel function	$I_v(\mathrm{t})$ is the solution to $\mathrm{t}^2\ddot{y}+t\dot{y}+(\mathrm{t}^2-\mathrm{v}^2)\,\mathrm{y}=0$
Extended Bessel function	$I_v(\mathrm{t})=\mathrm{j}^{-v}I_v(\mathrm{jt})$

Table Inverse Laplace transform with fractional and irrational operators

F(s)	***f* (t)** = $\mathcal{L}^{-1}[F(s)]$
$\dfrac{s^{\alpha\gamma-\beta}}{(s^{\alpha}+\alpha)^{\gamma}}$	$t^{\beta-1}\varepsilon^{\gamma}_{\alpha,\beta}(-at^{\alpha})$
$\dfrac{k}{s^2+k^2}\coth(\dfrac{\pi s}{2k})$	$\lvert\sin kt\rvert$
$\log\dfrac{s^2-a^2}{s^2}$	$\dfrac{2}{t}(1-\text{coshat})$
$\log\dfrac{s^2+a^2}{s^2}$	$\dfrac{2}{t}(1-\text{cosat})$
$\dfrac{1}{s^n\sqrt{s}}, n=1,2,3...$	$\dfrac{2^n t^{n-\frac{1}{2}}}{1.3.5...(2n-1)\sqrt{\pi}}$
$\arctan\dfrac{k}{s}$	$\dfrac{1}{t}\sin kt$
$\dfrac{1}{s\sqrt{s}}e^{-k\sqrt{s}}$	$2\sqrt{\dfrac{t}{\pi}}e^{-\frac{1}{4t}k^2}-\text{k}\ \text{er}\,fc(\dfrac{k}{2\sqrt{t}})$
$\dfrac{e^{-k\sqrt{s}}}{\sqrt{s}(\text{a}+\sqrt{\pi})}$	$e^{ak}e^{a^2t}\ \text{er}\,fc(\text{a}\sqrt{t}+\dfrac{k}{2\sqrt{t}})$
$\dfrac{(1-s)^n}{s^{n+\frac{1}{2}}}$	$\dfrac{n!}{(2n)!\sqrt{\pi t}}H_{2n}(\sqrt{t})$
$\dfrac{1}{\sqrt{(s^2+a^2)}}$	$I_0(at)$
$\dfrac{1}{\sqrt{(s^2-a^2)}}$	$I_0(at)$

F(s)	**$f(t) = \mathcal{L}^{-1}[F(s)]$**
$\frac{1}{\sqrt{(s+b)}(s+a)}$	$\frac{1}{\sqrt{b-a}}e^{-at}\ \mathrm{erf}(\sqrt{(b-a)\,t})$
$\frac{(1-s)^n}{s^{n+\frac{3}{2}}}$	$-\frac{n!}{(2n+1)!\sqrt{\pi}}H_{2n+1}(\sqrt{t})$
$\frac{(a-b)^k}{(\sqrt{(s+a)}+\sqrt{(s+a)})^{2k}}$	$\frac{k}{t}e^{-\frac{1}{2}(a+b)t}I_k(\frac{a-b}{2}t), k>0$
$\frac{\sqrt{(s+2a)}-\sqrt{s}}{\sqrt{(s+2a)}+\sqrt{s}}$	$\frac{1}{t}e^{-at}I_1(at)$
$\frac{(\sqrt{(s^2+a^2)}-s)^v}{\sqrt{(s^2+a^2)}}$	$a^v I_v(at), v>-1$
$\frac{(\sqrt{(s^2-a^2)}+s)^v}{\sqrt{(s^2-a^2)}}$	$a^v I_v(at), v>-1$
$\frac{\sqrt{(s+2a)}-\sqrt{s}}{\sqrt{(s+2a)}+\sqrt{s}}$	$\frac{1}{t}e^{-at}I_1(at)$
$\frac{1}{(s^2-a^2)^k}$	$\frac{\sqrt{\pi}}{\Gamma(k)}\left(\frac{t}{2a}\right)^{k-1/2} I_{k-\frac{1}{2}}(at)$
$\frac{1}{(s^2+a^2)^k}$	$\frac{\sqrt{\pi}}{\Gamma(k)}\left(\frac{t}{2a}\right)^{k-1/2} I_{k-\frac{1}{2}}(at)$
$(\sqrt{(s^2+a^2)}-s)^k$	$\frac{ka^k}{t}I_k(at), k>0$
$\frac{1}{s+\sqrt{s^2+a^2}}$	$\left(\frac{I_v(at)}{at}\right)$

F(s)	f **(t) =** $\mathcal{L}^{-1}[F(s)]$
$\log\frac{s-a}{s-b}$	$\frac{1}{t}(e^{bt}-e^{at})$
$\frac{1}{\sqrt{s+a}\sqrt{s+b}}$	$e^{-\frac{1}{2}(a+b)t} I_0\left(\frac{a-b}{2}t\right)$
$\frac{1}{(s+\sqrt{s^2+a^2})^N}$	$\left(\frac{N I_N(at)}{at}\right), N>0$
$\sqrt{s-a}-\sqrt{s-b}$	$\frac{1}{2\sqrt{\pi t^3}}(e^{bt}-e^{at})$
$\frac{1}{s}e^{\frac{-k}{s}}$	$I_0\left(2\sqrt{kt}\right)$
$\frac{b^2-a^2}{(s-a^2)(\sqrt{s}+b)}$	$e^{a^2t}\left[b-a\ erf(a\sqrt{t})\right]-be^{b^2t}erfc(b\sqrt{t})$
$\frac{\sqrt{s+2a}-\sqrt{s}}{\sqrt{s}}$	$ae^{-at}[I_1(at)+I_0(at)]$
$\frac{1}{\sqrt{s}}e^{\frac{-k}{s}}$	$\frac{1}{\sqrt{\pi t}}\cos 2\sqrt{kt}$
$\frac{1}{\sqrt{s}}e^{\frac{k}{s}}$	$\frac{1}{\sqrt{\pi t}}\cosh 2\sqrt{kt}$
$\frac{1}{s\sqrt{s}}e^{\frac{k}{s}}$	$\frac{1}{\sqrt{\pi k}}\sinh 2\sqrt{kt}$
$e^{\frac{-k}{\sqrt{s}}}$	$\frac{k}{2\sqrt{\pi t^3}}e^{-\frac{1}{4k}k^2}$

F(s)	$f(t) = L^{-1}[F(s)]$
$\frac{1}{s\sqrt{s}} e^{\frac{-k}{s}}$	$\frac{1}{\sqrt{\pi t}} \sin 2\sqrt{kt}$
$\frac{1}{s^{v}} e^{\frac{-k}{s}}$	$\left(\frac{t}{k}\right)^{\frac{1}{2}(v-1)} I_{v-1}\left(2\sqrt{kt}\right), v > 0$
$\frac{1}{s^{v}} e^{\frac{k}{s}}$	$\left(\frac{t}{k}\right)^{\frac{1}{2}(v-1)} I_{v-1}\left(2\sqrt{kt}\right)$
$\frac{1}{s} e^{-k\sqrt{s}}$	$erfc\left(\frac{k}{2\sqrt{t}}\right)$
$\frac{1}{\sqrt{s}} e^{-k\sqrt{s}}$	$\frac{k}{\sqrt{\pi t^{3}}} e^{-\frac{1}{4t}k^{2}}$
$\frac{1}{(s+a)^{\alpha}}$	$\frac{t^{\alpha-1}}{\Gamma(\alpha)} e^{-at}$
$\frac{1}{s\sqrt{s}} e^{\sqrt{s}}$	$2\sqrt{\frac{t}{\pi}} e^{-\frac{1}{4t}} - erfc\left(\frac{1}{2\sqrt{t}}\right)$
$\frac{1}{\sqrt{s}\sqrt{(s+1)}} e^{\sqrt{s}}$	$e^{t+1} erfc\left(\sqrt{t} + \frac{1}{2\sqrt{t}}\right)$
$\frac{1}{(s^{\alpha}+a)}$	$t^{\alpha-1}\varepsilon_{\alpha,\alpha}(-at^{\alpha})$
$\frac{1}{s(s^{\alpha}+a)}$	$1-\varepsilon_{\alpha}(-at^{\alpha})$
$\frac{1}{s^{\alpha}(s-a)}$	$t^{\alpha}\varepsilon_{1,1+\alpha}(at)$

F(s)	$\boldsymbol{f}$ **(t)** = $\Gamma^{-1}[F(\mathrm{s})]$
$\frac{s^{\alpha}}{\mathrm{s}(\mathrm{s}^{\alpha}+a)}$	$\varepsilon_{\alpha}(-\mathrm{at}^{\alpha})$
$\frac{s^{\alpha}}{\mathrm{s}-a}$	$-t^{\alpha}\varepsilon_{1,1-\alpha}(\mathrm{at}), 0<\alpha<1$
$\frac{1}{\sqrt{s}}$	$\frac{1}{\sqrt{\pi t}}$
$\frac{1}{\sqrt{s}(\mathrm{s}+1)}$	$\frac{2}{\sqrt{\pi}}daw(\sqrt{t})$
$\frac{1}{\sqrt{s}(\mathrm{s}+a^2)}$	$\sqrt{t}\varepsilon_{1,\frac{3}{2}}(-a^2\ \mathrm{t})$
$\frac{1}{s\sqrt{s}}$	$2\sqrt{\frac{t}{\pi}}$
$\frac{\sqrt{s}}{s+1}$	$\frac{1}{\sqrt{\pi t}}-\frac{2}{\sqrt{\pi}}daw(\sqrt{t})$
$\frac{s}{(\mathrm{s}-\mathrm{a})\sqrt{s-a}}$	$\frac{1}{\sqrt{\pi t}}e^{at}(1+2\mathrm{at})$
$\frac{\sqrt{s}}{(\mathrm{s}+a^2)}$	$\frac{1}{\sqrt{\pi}}\varepsilon_{1,\frac{1}{2}}(-a^2\ \mathrm{t})$
$\frac{1}{\mathrm{s}\sqrt{(\mathrm{s}+1)}}$	$erf(\sqrt{t})$
$\frac{1}{\sqrt{\mathrm{s}}(\mathrm{s}-\mathrm{a}^2)}$	$\frac{1}{a}e^{a^2t}\ \mathrm{erfc}(\mathrm{a}\sqrt{t})$

F(s)	**f (t) = $\Gamma^{-1}[F(s)]$**
$\frac{1}{\sqrt{s}+a}$	$\frac{1}{\sqrt{\pi t}} - ae^{a^2 t}\,\mathrm{erfc}(a\sqrt{t})$
$\frac{\sqrt{s}}{s-a^2}$	$\frac{1}{\sqrt{\pi t}} + ae^{a^2 t}\,\mathrm{erfc}(a\sqrt{t})$
$\frac{1}{\sqrt{s}(s+a^2)}$	$\frac{2}{a\sqrt{\pi}} e^{-a^2 t} \int_0^{a\sqrt{t}} e^{\tau^2}\, d\tau$
$\frac{1}{\sqrt{s}(\sqrt{s}+a)}$	$e^{a^2 t}\,\mathrm{erfc}(a\sqrt{t})$
$\frac{1}{\sqrt{(s+1)}}$	$\frac{e^{-t}}{\sqrt{\pi t}}$
$\frac{\sqrt{s}}{s-1}$	$\frac{1}{\sqrt{\pi t}} + e^t\,\mathrm{erf}(\sqrt{t})$
$\frac{1}{s^\alpha}$	$\frac{t^{\alpha-1}}{\Gamma(\alpha)}$
$\frac{s\sqrt{s}}{s+1}$	$2\sqrt{\frac{t}{\pi}} - \frac{2}{\sqrt{\pi}}\, daw(\sqrt{t})$
$\frac{1}{\sqrt{s}(s-1)}$	$e^t erf(\sqrt{t})$
$\frac{k!}{\sqrt{s}\pm\lambda}$	$t^{(k-1)/2}\varepsilon^{(k)}_{1/2,1/2}\left(\mp\lambda\sqrt{t}\right), R(s) > \lambda^2$
$\frac{s^{\alpha-1}}{s^\alpha \pm \lambda}$	$\varepsilon_\alpha\left(\mp\lambda t^\alpha\right), R(s) > \lvert\lambda\rvert^{1/\alpha}$

F(s)	**f (t) =** $\Gamma^{-1}[F(\mathrm{s})]$
$\dfrac{1}{\sqrt{s}(\mathrm{s+a})(\sqrt{s+a}+\sqrt{s})^{2v}}$	$\dfrac{1}{a^{v}}\mathrm{e}^{-at/2}\,\mathrm{I}_{v}\left(\dfrac{a}{2}t\right), k>0$
$\dfrac{\Gamma(\mathrm{k})}{(\mathrm{s+a})^{k}(\mathrm{s}+b)^{k}}$	$\sqrt{\pi}\left(\dfrac{t}{a-b}\right)^{k-\frac{1}{2}}\mathrm{e}^{-\frac{1}{2}(\mathrm{a+b})\mathrm{t}}\,\mathrm{I}_{k-\frac{1}{2}}\left(\dfrac{a-b}{2}t\right)$
$\dfrac{1}{\sqrt{\mathrm{s}^2+\mathrm{a}^2}(\mathrm{s}+\sqrt{s^2+a^2})^{N}}$	$\dfrac{J_N(\mathrm{at})}{a^N}$
$\dfrac{1}{\sqrt{\mathrm{s}^2+\mathrm{a}^2}(\mathrm{s}+\sqrt{s^2+a^2})}$	$\dfrac{J_1(\mathrm{at})}{a^N}$
$\dfrac{b^2-a^2}{\sqrt{s}(\mathrm{s}-\mathrm{a}^2)(\sqrt{\mathrm{s}}+b)}$	$e^{a^2t}\left[\dfrac{b}{a}erf(\mathrm{a}\sqrt{t})-1\right]+\sqrt{\pi}e^{b^2t}erfc(\mathrm{b}\sqrt{t})$
$\dfrac{ae^{-k\sqrt{s}}}{s(\mathrm{a}+\sqrt{s})}$	$-e^{ak}e^{a^2t}\left[erfc(\mathrm{a}\sqrt{t}+\dfrac{k}{2\sqrt{t}}\right]+erfc(\dfrac{k}{2\sqrt{t}})$
$\dfrac{1}{\sqrt{(\mathrm{s+a})(s+b)}+\sqrt{s+b}}$	$te^{-\frac{1}{2}(a+b)t}\left[I_o\left(\dfrac{a-b}{2}t\right)+I_1\left(\dfrac{a-b}{2}t\right)\right]$
$\dfrac{e^{-\sqrt{s}}}{\sqrt{s}+1}$	$\dfrac{e^{-\frac{1}{4k}}}{\sqrt{\pi t}}-e^{t+1}\left[erfc(\sqrt{t}+\dfrac{k}{2\sqrt{t}})\right]$
$\dfrac{e^{-\sqrt{s}}}{s(\sqrt{s}+1)}$	$erfc(\dfrac{1}{2\sqrt{t}})-e^{t+1}\left[erfc(\sqrt{t}+\dfrac{1}{2\sqrt{t}})\right]$

List Of Publications

1. **K. Muralidhar Goud** and S.K.Nagar (2015) ‘Fractional order PD controller design for non-monotonic phase systems’, Int. J. Automation and Control, Vol. 9, No. 2, pp.130–142. (Inderscience Publication)

2. **K. Muralidhar Goud** and S. K. Nagar ‘Control Quality Enhancement of Non-Monotonic System by fractional Order Controller’, IETE Journal of Research, Taylor and Francis Publications. (Under Review)

3. **K. Muralidhar Goud** and S.K.Nagar, “Design of Fraction Order Proportional Integral (FOPI) Controller for Buck Regulator”, National Conference “CISCON-2013” at MIT-Manipal.