REFERENCES

[1] R.C. Panda, C.-C. Yu, H.-P. Huang, PID tuning rules for SOPDT systems: Review and some new results, ISA transactions 43(2) (2004) 283-295.

[2] J.G. Ziegler, N.B. Nichols, Optimum settings for automatic controllers, trans. ASME 64(11) (1942) 759-765.

[3] G. Cohen and Coon, Theoretical consideration of retarded control, Trans. Asme 75 (1953) 827-834.

[4] R.L. Hills, Power from wind: a history of windmill technology, Cambridge University Press 1996.

[5] R.E. Bellman, Adaptive control processes: a guided tour, Princeton university press 2015.

[6] S. Bennett, A brief history of automatic control, IEEE Control Systems Magazine 16(3) (1996) 17-25.

[7] J.C. Maxwell, I. On governors, Proceedings of the Royal Society of London (16) (1868) 270-283.

[8] A. Newpower, Iron Men and Tin Fish: The Race to Build a Better Torpedo during World War II: The Race to Build a Better Torpedo during World War II, ABC-CLIO 2006.

[9] N. Minorsky, Directional stability of automatically steered bodies, Journal of the American Society for Naval Engineers 34(2) (1922) 280-309.

[10] K.M. Hangos, I.T. Cameron, Process modelling and model analysis, Academic press London 2001.

[11] M. Chidambaram, Mathematical Modelling and Simulation in Chemical Engineering, Cambridge University Press 2018.

[12] D. Chen, D.E. Seborg, PI/PID controller design based on direct synthesis and disturbance rejection, Industrial & engineering chemistry research 41(19) (2002) 4807-4822.

[13] Y. Lee, S. Park, M. Lee, C. Brosilow, PID controller tuning for desired closed-loop responses for SI/SO systems, Aiche journal 44(1) (1998) 106-115.

[14] C.E. Garcia, M. Morari, Internal model control. A unifying review and some new results, Industrial & Engineering Chemistry Process Design and Development 21(2) (1982) 308-323.

[15] M. Morari, Internal model control. 1. A unifying review and some new results, Ind. Eng. Chem. Process Des. Dev. 21 (1986) 308-323.

[16] D.E. Rivera, M. Morari, S. Skogestad, Internal model control: PID controller design, Industrial & engineering chemistry process design and development 25(1) (1986) 252-265.

[17] R. Tchamna, M.A. Qyyum, M. Zahoor, C. Kamga, E. Kwok, M. Lee, Analytical design of constraint handling optimal two parameter internal model control for dead-time processes, Korean Journal of Chemical Engineering 36(3) (2019) 356-367.

[18] C.-q. Yin, H.-t. Wang, Q. Sun, L. Zhao, Improved Cascade Control System for a Class of Unstable Processes with Time Delay, International Journal of Control, Automation and Systems 17(1) (2019) 126-135.

[19] K.G. Begum, A.S. Rao, T. Radhakrishnan, Optimal controller synthesis for second order time delay systems with at least one RHP pole, ISA Transactions 73 (2018) 181-188.

[20] K.J. Åström, T. Hägglund, PID controllers: theory, design, and tuning, Instrument Society of America, Research Triangle Park, NC 10 (1995).

[21] R.C. Panda, Synthesis of PID tuning rule using the desired closed-loop response, Industrial & Engineering Chemistry Research 47(22) (2008) 8684-8692.

[22] A. Anusha, A.S. Rao, Design and analysis of IMC based PID controller for unstable systems for enhanced closed loop performance, IFAC Proceedings Volumes 45(3) (2012) 41-46.

[23] C. Smith, A. Corripio, J. Martin, Controller tuning from simple process models, Instrumentation Technology 22(12) (1975) 39-44.

[24] M. Morari, E. Zafiriou, Robust process control, Morari 1989.

[25] D.E. Seborg, D.A. Mellichamp, T.F. Edgar, F.J. Doyle III, Process dynamics and control, John Wiley & Sons 2010.

[26] A.S. Rao, V. Rao, M. Chidambaram, Direct synthesis-based controller design for integrating processes with time delay, Journal of the Franklin Institute 346(1) (2009) 38-56.

[27] W. Cho, J. Lee, T.F. Edgar, Simple analytic proportional-integral-derivative (PID) controller tuning rules for unstable processes, Industrial & Engineering Chemistry Research 53(13) (2013) 5048-5054.

[28] A.S. Rao, M. Chidambaram, Enhanced two-degrees-of-freedom control strategy for second-order unstable processes with time delay, Industrial & engineering chemistry research 45(10) (2006) 3604-3614.

[29] A.S. Rao, M. Chidambaram, Control of unstable processes with two RHP poles, a zero and time delay, Asia-Pacific Journal of Chemical Engineering 1(1-2) (2006) 63-69.

[30] B. Vanavil, K.K. Chaitanya, A.S. Rao, Improved PID controller design for unstable time delay processes based on direct synthesis method and maximum sensitivity, International Journal of Systems Science 46(8) (2015) 1349-1366.

[31] C. Anil, R.P. Sree, Tuning of PID controllers for integrating systems using direct synthesis method, ISA transactions 57 (2015) 211-219.

[32] D. Chanti Babu, D. Santosh Kumar, R. Padma Sree, Tuning of PID controllers for unstable systems using direct synthesis method, Indian Chemical Engineer 59(3) (2017) 215-241.

[33] S. Sundaramoorthy, M. Ramasamy, Tuning optimal proportional–integral–derivative controllers for desired closed-loop response using the method of moments, Industrial & Engineering Chemistry Research 53(44) (2014) 17403-17418.

[34] M.N. Anwar, S. Pan, A new PID load frequency controller design method in frequency domain through direct synthesis approach, International Journal of Electrical Power & Energy Systems 67 (2015) 560-569.

[35] J.-C. Jeng, A model-free direct synthesis method for PI/PID controller design based on disturbance rejection, Chemometrics and Intelligent Laboratory Systems 147 (2015) 14-29.

[36] N.-S. Pai, S.-C. Chang, C.-T. Huang, Tuning PI/PID controllers for integrating processes with deadtime and inverse response by simple calculations, Journal of Process Control 20(6) (2010) 726-733.

[37] R. Vilanova, O. Arrieta, P. Ponsa, Robust PI/PID controllers for load disturbance based on direct synthesis, ISA transactions 81 (2018) 177-196.

[38] I.-L. Chien, IMC-PID controller design-an extension, IFAC Proceedings Volumes 21(7) (1988) 147-152.

[39] I.-L. Chien, Consider IMC tuning to improve controller performance, Chem. Eng. Prog. 86 (1990) 33-41.

[40] G.E. Rotstein, D.R. Lewin, Simple PI and PID tuning for open-loop unstable systems, Industrial & engineering chemistry research 30(8) (1991) 1864-1869.

[41] I.G. Horn, J.R. Arulandu, C.J. Gombas, J.G. VanAntwerp, R.D. Braatz, Improved filter design in internal model control, Industrial & engineering chemistry research 35(10) (1996) 3437-3441.

[42] X.-P. Yang, Q.-G. Wang, C. Hang, C. Lin, IMC-based control system design for unstable processes, Industrial & engineering chemistry research 41(17) (2002) 4288-4294.

[43] W. Tan, H.J. Marquez, T. Chen, IMC design for unstable processes with time delays, Journal of Process Control 13(3) (2003) 203-213.

[44] K.J. Åström, T. Hägglund, PID controllers: theory, design, and tuning, Instrument society of America Research Triangle Park, NC 1995.

[45] W.L. Luyben, Tuning Proportional− Integral Controllers for Processes with Both Inverse Response and Deadtime, Industrial & engineering chemistry research 39(4) (2000) 973-976.

[46] S. Skogestad, Simple analytic rules for model reduction and PID controller tuning, Journal of process control 13(4) (2003) 291-309.

[47] M. Shamsuzzoha, M. Lee, IMC− PID Controller Design for Improved Disturbance Rejection of Time-Delayed Processes, Industrial & Engineering Chemistry Research 46(7) (2007) 2077-2091.

[48] M. Shamsuzzoha, M. Lee, Design of advanced PID controller for enhanced disturbance rejection of second-order processes with time delay, AIChE Journal 54(6) (2008) 1526-1536.

[49] M. Shamsuzzoha, S. Lee, M. Lee, Analytical design of PID controller cascaded with a lead-lag filter for time-delay processes, Korean Journal of Chemical Engineering 26(3) (2009) 622-630.

[50] M. Shamsuzzoha, M. Skliar, M. Lee, Design of IMC filter for PID control strategy of open-loop unstable processes with time delay, Asia-Pacific Journal of Chemical Engineering 7(1) (2012) 93-110.

[51] C.N. Rao, R.P. Sree, IMC based controller design for integrating systems with time delay, Indian Chemical Engineer 52(3) (2010) 194-218.

[52] T.N.L. Vu, M. Lee, A unified approach to the design of advanced proportional-integral-derivative controllers for time-delay processes, Korean Journal of Chemical Engineering 30(3) (2013) 546-558.

[53] Q.b. Jin, Q. Liu, Q. Wang, S.n. Li, Z. Wang, IMC–PID design: analytical optimization for performance/robustness tradeoff tuning for servo/regulation mode, Asian Journal of Control 16(4) (2014) 1252-1261.

[54] M. Shamsuzzoha, A unified approach for proportional-integral-derivative controller design for time delay processes, Korean Journal of Chemical Engineering 32(4) (2015) 583-596.

[55] G.K.R.P. Vuppu, S.M. Venkata, S. Kodati, Robust design of PID controller using IMC technique for integrating process based on maximum sensitivity, Journal of Control, Automation and Electrical Systems 26(5) (2015) 466-475.

[56] Q. Wang, C. Lu, W. Pan, IMC PID controller tuning for stable and unstable processes with time delay, Chemical engineering research and design 105 (2016) 120-129.

[57] M. Shamsuzzoha, IMC based robust PID controller tuning for disturbance rejection, Journal of Central South University 23(3) (2016) 581-597.

[58] J.-C. Jeng, G.-P. Ge, Disturbance-rejection-based tuning of proportional–integral–derivative controllers by exploiting closed-loop plant data, ISA transactions 62 (2016) 312-324.

[59] G.C. Newton, L.A. Gould, J.F. Kaiser, Analytical design of linear feedback controls, (1957).

[60] A.A. Nasution, J.-C. Jeng, H.-P. Huang, Optimal H 2 IMC-PID Controller with Set-Point Weighting for Time-Delayed Unstable Processes, Industrial & Engineering Chemistry Research 50(8) (2011) 4567-4578.

[61] K.G. Begum, A.S. Rao, T. Radhakrishnan, Maximum sensitivity based analytical tuning rules for PID controllers for unstable dead time processes, Chemical Engineering Research and Design 109 (2016) 593-606.

[62] K.G. Begum, A.S. Rao, T. Radhakrishnan, Enhanced IMC based PID controller design for non-minimum phase (NMP) integrating processes with time delays, ISA transactions 68 (2017) 223-234.

[63] K.G. Begum, T. Radhakrishnan, A.S. Rao, M. Chidambaram, IMC based PID controller tuning of series cascade unstable systems, IFAC-PapersOnLine 49(1) (2016) 795-800.

[64] P.R. Dasari, M. Chidambaram, A.S. Rao, Simple method of calculating dynamic set-point weighting parameters for time delayed unstable processes, IFAC-PapersOnLine 51(1) (2018) 395-400.

[65] D.S. Kumar, R.P. Sree, Tuning of IMC based PID controllers for integrating systems with time delay, ISA transactions 63 (2016) 242-255.

[66] M.K. JHUNJHUNWALA, M. Chidambaram, PID controller tuning for unstable systems by optimization method, Chemical Engineering Communications 185(1) (2001) 91-113.

[67] S.S. Kumar, V.R. Kumar, G.P. Reddy, Nonlinear control of bioreactors with input multiplicities—an experimental work, Bioprocess and biosystems engineering 28(1) (2005) 45-53.

[68] A.V. Vinod, K.A. Kumar, G.V. Reddy, Simulation of biodegradation process in a fluidized bed bioreactor using genetic algorithm trained feedforward neural network, Biochemical Engineering Journal 46(1) (2009) 12-20.

[69] Z.K. Nagy, Model based control of a yeast fermentation bioreactor using optimally designed artificial neural networks, Chemical engineering journal 127(1-3) (2007) 95-109.

[70] N. Pachauri, A. Rani, V. Singh, Bioreactor temperature control using modified fractional order IMC-PID for ethanol production, Chemical Engineering Research and Design 122 (2017) 97-112.

[71] O. Khan, C.M.R. Madhuranthakam, P. Douglas, H. Lau, J. Sun, P. Farrell, Optimized PID controller for an industrial biological fermentation process, Journal of Process Control 71 (2018) 75-89.

[72] M. Ławryńczuk, Modelling and nonlinear predictive control of a yeast fermentation biochemical reactor using neural networks, Chemical Engineering Journal 145(2) (2008) 290-307.

[73] E.G. Boza-Condorena, D.I.P. Atala, A. Carvalho da Costa, Non-linear predictive control of a fermentor in a continuous reaction-separation process, Proceedings of the World Congress on Engineering and Computer Science, 2011, pp. 19-21.

[74] M.L. Shuler, F. Kargi, Bioprocess Engineering: Basic Concepts. 2nd, Upper Saddle (2002).

[75] E. Amillastre, C.-A. Aceves-Lara, J.-L. Uribelarrea, S. Alfenore, S.E. Guillouet, Dynamic model of temperature impact on cell viability and major product formation during fed-batch and continuous ethanolic fermentation in Saccharomyces cerevisiae, Bioresource technology 117 (2012) 242-250.

[76] U. Imtiaz, S.S. Jamuar, J. Sahu, P. Ganesan, Bioreactor profile control by a nonlinear auto regressive moving average neuro and two degree of freedom PID controllers, Journal of Process Control 24(11) (2014) 1761-1777.

[77] S. Ramaswamy, T. Cutright, H. Qammar, Control of a continuous bioreactor using model predictive control, Process Biochemistry 40(8) (2005) 2763-2770.

[78] N. Pachauri, V. Singh, A. Rani, Two degree of freedom PID based inferential control of continuous bioreactor for ethanol production, ISA transactions 68 (2017) 235-250.

[79] U. Imtiaz, A. Assadzadeh, S.S. Jamuar, J. Sahu, Bioreactor temperature profile controller using inverse neural network (INN) for production of ethanol, Journal of Process Control 23(5) (2013) 731-742.

[80] N. Pachauri, V. Singh, A. Rani, Two degrees-of-freedom fractional-order proportional–integral–derivative-based temperature control of fermentation process, Journal of Dynamic Systems, Measurement, and Control 140(7) (2018) 071006.

[81] R.R. Fonseca, J.E. Schmitz, A.M.F. Fileti, F.V. da Silva, A fuzzy–split range control system applied to a fermentation process, Bioresource technology 142 (2013) 475-482.

[82] A. Flores-Hernández, J. Reyes-Reyes, C. Astorga-Zaragoza, G. Osorio-Gordillo, C. García-Beltrán, Temperature control of an alcoholic fermentation process through the

Takagi–Sugeno modeling, Chemical Engineering Research and Design 140 (2018) 320-330.

[83] G. Harja, I. Nascu, C. Muresan, I. Nascu, Improvements in dissolved oxygen control of an activated sludge wastewater treatment process, Circuits, Systems, and Signal Processing 35(6) (2016) 2259-2281.

[84] K. Ogata, Modern control engineering, Prentice Hall Upper Saddle River, NJ 2009.

[85] B. Roffel, B. Betlem, Process dynamics and control: modeling for control and prediction, John Wiley & Sons 2007.

[86] S. Aiba, M. Shoda, M. Nagatani, Kinetics of product inhibition in alcohol fermentation, Biotechnology and bioengineering 10(6) (1968) 845-864.

[87] F. Kargi, M.L. Shuler, Bioprocess engineering: basic concepts, Prentice-Hall PTR 1992.

[88] P. Tervasmäki, M. Latva-Kokko, S. Taskila, J. Tanskanen, Effect of oxygen transfer on yeast growth—Growth kinetic and reactor model to estimate scale-up effects in bioreactors, Food and Bioproducts Processing 111 (2018) 129-140.

[89] T.W. Nagodawithana, C. Castellano, K.H. Steinkraus, Effect of dissolved oxygen, temperature, initial cell count, and sugar concentration on the viability of Saccharomyces cerevisiae in rapid fermentations, Appl. Environ. Microbiol. 28(3) (1974) 383-391.

[90] J.G. Truxal, L. Weinberg, Automatic feedback control system synthesis, Physics Today 8 (1955) 17.

[91] J.R. Ragazzini, G.F. Franklin, Sampled-data control systems, (1958).

[92] V. Vijayan, R.C. Panda, Design of PID controllers in double feedback loops for SISO systems with set-point filters, ISA transactions 51(4) (2012) 514-521.

[93] J. Veldsink, G. Versteeg, W. Van Swaaij, Intrinsic kinetics of the oxidation of methane over an industrial copper (II) oxide catalyst on a γ-alumina support, The Chemical Engineering Journal and the Biochemical Engineering Journal 57(3) (1995) 273-283.

[94] S. Skogestad, I. Postlethwaite, Multivariable feedback control: analysis and design, Wiley New York 2007.

[95] M. Kumar, D. Prasad, B.S. Giri, R.S. Singh, Temperature control of fermentation bioreactor for ethanol production using IMC-PID controller, Biotechnology Reports 22 (2019) e00319.

[96] V.M. Alfaro, R. Vilanova, O. Arrieta, Maximum Sensitivity Based Robust Tuning for Two-Degree-of-Freedom Proportional− Integral Controllers, Industrial & Engineering Chemistry Research 49(11) (2010) 5415-5423.

[97] S. Uma, M. Chidambaram, A.S. Rao, Set point weighted modified Smith predictor with PID filter controllers for non-minimum-phase (NMP) integrating processes, Chemical Engineering Research and Design 88(5-6) (2010) 592-601.

[98] M. Shamsuzzoha, M. Lee, PID controller design for integrating processes with time delay, Korean Journal of Chemical Engineering 25(4) (2008) 637-645.

[99] S. Saxena, Y.V. Hote, Internal model control based PID tuning using first-order filter, International Journal of Control, Automation and Systems 15(1) (2017) 149-159.

[100] Q.-G. Wang, C. C. Hang, and X.-P. Yang, Single-loop controller design via IMC principles, *Automatica* (2001) 2041-2048.

[101] S. Anusha, G. Karpagam, E. BHUVANESWARI, Comparison of tuning methods of PID controller, International Journal of Management, Information Technology and Engineering 2 (2014) 1-8.