

DAFTAR PUSTAKA

- [1] H. Dibyo Laksono and F. Retno Ningsih, “Simulasi dan Analisa Sistem Kendali Frekuensi Tenaga Listrik dengan Pilot Servo dan Kombinasi Pengendali Model Standar (Model Hidraulik),” *Jurnal Amplifier Mei*, vol. 13, 2023.
- [2] V. T. Wahyuni¹, B. Puguh Manunggal, and A. A. Melkias, “Analisis Setting Speed Droop Dan Deadband Governor Unit 1 PLTA Maninjau Sebagai Pengaturan Frekuensi Pada Sistem 150 Kv,” *Jurnal Energi*, vol. 11, 2022.
- [3] S. Tripathi, V. P. Singh, N. Kishor, and A. S. Pandey, “Load frequency control of power system considering electric Vehicles’ aggregator with communication delay,” *International Journal of Electrical Power and Energy Systems*, vol. 145, Feb. 2023, doi: 10.1016/j.ijepes.2022.108697.
- [4] A. Q. Al-Shetwi *et al.*, “Active Power Control to Mitigate Frequency Deviations in Large-Scale Grid-Connected PV System Using Grid-Forming Single-Stage Inverters,” *Energies (Basel)*, vol. 15, no. 6, Mar. 2022, doi: 10.3390/en15062035.
- [5] Kementerian Energi dan Sumber Daya Mineral, “Peraturan Menteri Energi dan Sumber Daya Mineral Nomor 20 Tahun 2020 tentang Aturan Jaringan Sistem Tenaga Listrik (Grid Code),” Jakarta, Dec. 2020.
- [6] M. Muhtar, “Analisis Pelepasan Beban Menggunakan Under Frequency Relay pada Sistem Tenaga Listrik Gardu Induk Palopo,” *JTEIN: Jurnal Teknik Elektro Indonesia*, vol. 3, no. 1, pp. 54–62, Jan. 2022, doi: 10.24036/jtein.v3i1.194.
- [7] I. Wayan Sugara Yasa, G. Nur, and M. Asna, “Analisis Sistem House Load Dalam Menunjang Keandalan Penyaluran Listrik di PLTDG Pesanggaran,” 2021.
- [8] M. Shukla and P. V Vishal Mehtre, “Power System Stability and Control,” 2022.

- [9] A. Omaruddin and P. Trodden, "LMI-based Decentralized Load Frequency Control of a Hybrid Power System with a Virtual Synchronous Generator and Battery Storage," in *IFAC-PapersOnLine*, Elsevier B.V., Jul. 2023, pp. 10910–10916. doi: 10.1016/j.ifacol.2023.10.775.
- [10] W. Qian, D. Lu, and Y. Wu, "Adaptive memory event-triggered load frequency control for multiarea power systems with non-ideal communication channel," *Electric Power Systems Research*, vol. 245, Aug. 2025, doi: 10.1016/j.epsr.2025.111596.
- [11] H. Dibyo Laksono, A. Widi Adriana, and J. Teknik Elektro, "Analisa Sistem Load Frequency Control dengan Metoda Linear Quadratic Gaussian (LQG) dan Linear Quadratic Gaussian-Loop Transfer Recovery (LQG-LTR)," vol. 12, 2022.
- [12] Y. Sun, W. Xue, J. Liu, X. Qi, and H. Deng, "Disturbance-exploitation based RMPC with application to multi-objective load frequency control in power systems," *Control Eng Pract*, vol. 156, Mar. 2025, doi: 10.1016/j.conengprac.2024.106179.
- [13] B. Khokhar and K. P. S. Parmar, "Impact analysis of capacitive energy storage integration on load frequency control performance of microgrids employing a new dual-stage controller," *ISA Trans*, May 2025, doi: 10.1016/j.isatra.2025.04.003.
- [14] Md. S. Sarker, Md. I. Ahmed, Md. A. Hossain, Md. R. Islam, Md. A. Hossain, and Md. R. I. Sheikh, "Enhanced load frequency control in multi-source power systems with stochastic optimization algorithms and SMES integration via AC-DC parallel tie-lines," *Next Research*, vol. 2, no. 2, p. 100288, Jun. 2025, doi: 10.1016/j.nexres.2025.100288.
- [15] W. Willy Metyu Febryanto Simorangkir, I. Made Mataram, I. Ketut Wijaya, J. Raya Kampus Unud, K. Kuta Sel, and K. Badung, "Kontrol Frekuensi Beban Menggunakan Metode Adaptive Neuro Fuzzy Inference System (ANFIS) Pada Sistem Hybrid Wind Mikrohidro Dan Diesel," 2023.
- [16] W. Qian, D. Lu, and Y. Wu, "Adaptive Memory Event-Triggered Load

Frequency Control for Multiarea Power Systems with Non-Ideal Communication Channel.” [Online]. Available: <https://ssrn.com/abstract=4937218>

- [17] R. Asghar, F. Riganti Fulginei, H. Wadood, and S. Saeed, “A Review of Load Frequency Control Schemes Deployed for Wind-Integrated Power Systems,” May 01, 2023, *MDPI*. doi: 10.3390/su15108380.
- [18] V. N. Ogar, S. Hussain, and K. A. A. Gamage, “Load Frequency Control Using the Particle Swarm Optimisation Algorithm and PID Controller for Effective Monitoring of Transmission Line,” *Energies (Basel)*, vol. 16, no. 15, Aug. 2023, doi: 10.3390/en16155748.
- [19] S. B. Masikana, G. Sharma, and S. Sharma, “Renewable energy sources integrated load frequency control of power system: A review,” *e-Prime - Advances in Electrical Engineering, Electronics and Energy*, vol. 8, Jun. 2024, doi: 10.1016/j.prime.2024.100605.
- [20] M. Prambudi¹, M. Effendy², and E. A. Hakim³, “Analisa Perbandingan Pengaturan Frekuensi Pada PLTMH Dengan PID Berbasis PSO dan GA,” *JEECOM*, vol. 3, no. 2, 2021.
- [21] S. Nurrahma, T. Arif Berbudi, M. Rakha Firdaus, G. Izzaulhaq, and I. Hudati, “Implementasi Kontrol PID pada Kopel Motor DC dengan Menggunakan Filter Kalman,” vol. 4, no. 1, 2023.
- [22] G. I. Y. Mustafa, M. D. Masum, and M. D. Siam, “A new model-free control for load frequency control of interconnected power systems based on nonlinear disturbance observer,” *Energy Reports*, vol. 12, pp. 4998–5008, Dec. 2024, doi: 10.1016/j.egyr.2024.10.054.
- [23] A. Ma’Arif, Iswanto, N. M. Raharja, P. A. Rosyady, A. R. C. Baswara, and A. A. Nuryono, “Control of DC Motor Using Proportional Integral Derivative (PID): Arduino Hardware Implementation,” in *Proceeding - 2020 2nd International Conference on Industrial Electrical and Electronics, ICIEE 2020*, Institute of Electrical and Electronics Engineers Inc., Oct. 2020, pp. 74–78. doi: 10.1109/ICIEE49813.2020.9277258.

- [24] M. Shouran, "Load Frequency Control for Multi-Area Interconnected Power System Using Artificial Intelligent Controllers," 2022.
- [25] N. Milleno, "Simulasi Dan Analisis Sistem Kendali Load Frequency Control (LFC) Dengan Menggunakan Pengendali Tunggal Dan Dua Derajat Kebebasan," 2024.
- [26] D. Ramadhani, "Analisis Performansi Domain Waktu Sistem Kendali Load Frequency Control Tipe Hidraulik Menggunakan Konfigurasi Pengendali Tunggal Dan Kaskade," Universitas Andalas, 2024.
- [27] A. Tiftazani, "Simulasi Dan Analisis Pada Sistem Kendali Load Frequency Control Dengan Konfigurasi," Universitas Andalas, 2024.
- [28] G. A. Almahri, "Resilient Power System Load Frequency Control," 2025. Accessed: May 29, 2025. [Online]. Available: <https://repository.rit.edu>
- [29] Y. Güler, M. Nalbantoğlu, and İ. Kaya, "Cascade controller design via controller synthesis for load frequency control of electrical power systems," *Turkish Journal of Electrical Engineering and Computer Sciences*, vol. 32, no. 2, pp. 285–304, 2024, doi: 10.55730/1300-0632.4069.
- [30] M. B. Ginting, N. Sinuhaji, I. Margaretta, B. Tarigan, J. Sei, and B. Hari, "Sistem Kontrol dan Monitoring AC dengan Menggunakan Metode Fuzzy Mamdani Berbasis IoT," *Journal of Information System Research*, vol. 6, no. 1, pp. 371–385, 2024, doi: 10.47065/josh.v6i1.5944.
- [31] R. T. Asnada, "Pengaruh Inertial Measurement Unit (IMU) MPU-6050 3-Axis Gyro dan 3-Axis Accelerometer pada Sistem Penstabil Kamera (Gimbal) Untuk Aplikasi Videografi," *Januari*, vol. 11, no. 1, p. 48, 2020.
- [32] Y. O. M. Sekyere, F. B. Effah, and P. Y. Okyere, "Optimally tuned cascaded FOPI-FOPIDN with improved PSO for load frequency control in interconnected power systems with RES," *Journal of Electrical Systems and Information Technology*, vol. 11, no. 1, Jul. 2024, doi: 10.1186/s43067-024-00149-x.
- [33] H. D. Laksono, D. R. Putri, M. Muharam, R. W. Pratama, and R. Nofendra,

- “Analisis Kinerja Pengendali Kaskade Pada Sistem Load Frequency Control (LFC) Hidraulik Menggunakan PIDTune Model Standard,” *Majalah Ilmiah Teknologi Elektro*, vol. 23, no. 2, p. 291, Feb. 2025, doi: 10.24843/MITE.2024.v23i02.P13.
- [34] M. Wu, D. Ma, K. Xiong, and L. Yuan, “Optimizing load frequency control in isolated island city microgrids: a deep graph reinforcement learning approach with data enhancement across extensive scenarios,” *Front Energy Res*, vol. 12, 2024, doi: 10.3389/fenrg.2024.1384995.
- [35] S. M. Said, I. C. Gunadin, and F. Az-Zahra, “Studi Kestabilan Frekuensi Sistem Kelistrikan Pada Pabrik PT. Semen Tonasa Setelah On-Grid Dengan PLN,” *Jurnal EKSITASI*, vol. 2, no. 2, p. 2023, 2023.
- [36] C. N. S. Kalyan, B. S. Goud, C. R. Reddy, H. S. Ramadan, M. Bajaj, and Z. M. Ali, “Water cycle algorithm optimized type ii fuzzy controller for load frequency control of a multi-area, multi-fuel system with communication time delays,” *Energies (Basel)*, vol. 14, no. 17, Sep. 2021, doi: 10.3390/en14175387.
- [37] D. Sharma, “Load Frequency Control: A Literature Review,” *Article in International Journal of Scientific & Technology Research*, vol. 9, p. 2, 2020, [Online]. Available: www.ijstr.org
- [38] D. D. Rasolomampionona, M. Połeczki, K. Zagrajek, W. Wróblewski, and M. Januszewski, “A Comprehensive Review of Load Frequency Control Technologies,” Jun. 01, 2024, *Multidisciplinary Digital Publishing Institute (MDPI)*. doi: 10.3390/en17122915.
- [39] P. Gopi, N. C. Alluraiah, P. H. Kumar, M. Bajaj, V. Blazek, and L. Prokop, “Improving load frequency controller tuning with rat swarm optimization and porpoising feature detection for enhanced power system stability,” *Sci Rep*, vol. 14, no. 1, Dec. 2024, doi: 10.1038/s41598-024-66007-y.
- [40] R. Rofi, I. Riyadi Mardiyanto, and S. Utami, “Perancangan dan Simulasi Pengendalian Governing Isochronous pada PLTP Darajat,” 2021.

- [41] A. Singh, S. Yadav, N. Tiwari, D. K. Nishad, and S. Khalid, "Optimized PID controller and model order reduction of reheated turbine for load frequency control using teaching learning-based optimization," *Sci Rep*, vol. 15, no. 1, p. 3759, Dec. 2025, doi: 10.1038/s41598-025-87866-z.
- [42] D. H. Tuan, D. T. Tran, V. Nguyen Ngoc Thanh, and V. Van Huynh, "Load Frequency Control Based on Gray Wolf Optimizer Algorithm for Modern Power Systems," *Energies (Basel)*, vol. 18, no. 4, Feb. 2025, doi: 10.3390/en18040815.
- [43] H. Dibyo Laksono, M. Latif, E. Amri Gunawan, and R. Afrianita, "Sistem Pengatur Tegangan Otomatis: Analisa Peralihan dengan Pengendali Tunggal dan Kaskade," vol. 11, 2021.
- [44] H. Dibyo Laksono, *Sistem Kendali Dengan PID*. Padang, 2020.
- [45] A. A. Abou El-Ela, R. A. El-Sehiemy, A. M. Shaheen, and A. E. G. Diab, "Design of cascaded controller based on coyote optimizer for load frequency control in multi-area power systems with renewable sources," *Control Eng Pract*, vol. 121, Apr. 2022, doi: 10.1016/j.conengprac.2021.105058.
- [46] Md. S. Iqbal, Md. F. A. Limon, Md. M. Kabir, Md. Z. Hossain, Md. F. Jubayer, and Md. J. A. Soeb, "A hybrid optimization algorithm based on cascaded (1 + PI)-PI-PID controller for load frequency control in interconnected power systems," *Results in Engineering*, vol. 24, p. 103624, Dec. 2024, doi: 10.1016/j.rineng.2024.103624.
- [47] J. Hussain, R. Zou, P. K. Pathak, A. Karni, and S. Akhtar, "Design of a novel cascade PI-(1+FOPID) controller to enhance load frequency control performance in diverse electric power systems," *Electric Power Systems Research*, vol. 243, Jun. 2025, doi: 10.1016/j.epsr.2025.111488.
- [48] Abdulslam A. Aloukili, Tarek M. Nasser, and Mohammed A. Mehann, "Improving Load Frequency Control Using A Pid Controller With A Derivative Filter Based On Artificial Intelligence," *Journal of Southwest Jiaotong University*, vol. 58, no. 4, 2023, doi: 10.35741/issn.0258-2724.58.4.102.

- [49] S. Rajamand, "Load frequency control and dynamic response improvement using energy storage and modeling of uncertainty in renewable distributed generators," *J Energy Storage*, vol. 37, May 2021, doi: 10.1016/j.est.2021.102467.
- [50] D. K. Gupta *et al.*, "Fractional order PID controller for load frequency control in a deregulated hybrid power system using Aquila Optimization," *Results in Engineering*, vol. 23, Sep. 2024, doi: 10.1016/j.rineng.2024.102442.
- [51] J. L. Guzmán, D. E. Rivera, M. Berenguel, and S. Dormido, "i-pIDtune 2.0: An Updated Interactive Tool for Integrated System Identification and PID Control," in *IFAC-PapersOnLine*, Elsevier B.V., Jun. 2024, pp. 61–66. doi: 10.1016/j.ifacol.2024.08.011.
- [52] Ihsanul Muqorrobin, Antonius Edy Kristiyono, and Agus Prawoto, "Perancangan Sistem Kontrol Jarak Jauh Berbasis PID Menggunakan Blynk pada Gandrum di Kapal," *Jurnal Penelitian Rumpun Ilmu Teknik*, vol. 3, no. 3, pp. 129–152, Aug. 2024, doi: 10.55606/juprit.v3i3.4239.
- [53] M. F. A. Limon *et al.*, "Grey wolf optimization-based fuzzy-PID controller for load frequency control in multi-area power systems," *Journal of Automation and Intelligence*, 2025, doi: 10.1016/j.jai.2025.01.002.
- [54] Y. O. M. Sekyere, F. B. Effah, and P. Y. Okyere, "Optimal Tuning of PID Controllers for LFC in Renewable Energy Source Integrated Power Systems Using an Improved PSO," *Journal of Electronics and Electrical Engineering*, Jan. 2024, doi: 10.37256/jee.3120243869.
- [55] Z. Qu, W. Younis, X. Liu, A. K. Junejo, S. Z. Almutairi, and P. Wang, "Optimized PID Controller for Load Frequency Control in Multi-Source and Dual-Area Power Systems Using PSO and GA Algorithms," *IEEE Access*, 2024, doi: 10.1109/ACCESS.2024.3445165.
- [56] A. Sharma and N. Singh, "Load frequency control of connected multi-area multi-source power systems using energy storage and lyrebird optimization algorithm tuned PID controller," *J Energy Storage*, vol. 100, Oct. 2024, doi:

10.1016/j.est.2024.113609.

- [57] L. Wang, “Basics of PID Control,” 2020. [Online]. Available: <https://www.researchgate.net/publication/346653954>
- [58] H. D. Laksono and R. Ampuh Hadiguna, “Simulasi Pola Tingkah Laku Sistem Automatic Voltage Regulator (AVR) Tipe Arus Searah Dengan Metoda PIDTune Model Standard,” *Jurnal Amplifier : Jurnal Ilmiah Bidang Teknik Elektro Dan Komputer*, vol. 14, no. 1, pp. 78–88, May 2023, doi: 10.33369/jamplifier.v14i1.32464.
- [59] Heru Dibyo Laksono, *PIDTune Model Paralel dan Model Standard*. Padang: LPPM Universitas Andalas, 2021.
- [60] “Power System Load Frequency Control Classical and Adaptive Fuzzy Approaches.”
- [61] F. L. Fadhlika, “Simulasi Dan Analisis Sistem Kendali Automatic Voltage Regulator Tipe Arus Searah Dengan Pidtune Dengan Berbagai Arsitektur Kendali,” Padang, Aug. 2025. Accessed: Aug. 22, 2025. [Online]. Available: <http://scholar.unand.ac.id/502058/>

