

DAFTAR PUSTAKA

- [1] “Perkembangan Transportasi Nasional Maret 2024,” Mar. 2024. Accessed: Jun. 29, 2025. [Online]. Available: <https://www.bps.go.id/id/pressrelease/2024/05/02/2362/pada-maret-2024--jumlah-penumpang-kereta-yang-berangkat-naik-2-71-persen-dibandingkan-februari-2024-.html>
- [2] Raka B. Lubis, “63 Insiden Kecelakaan Kereta Api Terjadi di Indonesia dalam 5 Tahun Terakhir.” Accessed: Jun. 29, 2025. [Online]. Available: <https://goodstats.id/article/63-insiden-kecelakaan-kereta-api-terjadi-di-indonesia-dalam-5-tahun-terakhir-AQvtn>
- [3] J. Pombo and J. Ambrósio, “An alternative method to include track irregularities in railway vehicle dynamic analyses,” *Nonlinear Dyn*, vol. 68, no. 1–2, pp. 161–176, Apr. 2012, doi: 10.1007/s11071-011-0212-2.
- [4] X. Liu, M. R. Saat, and C. P. L. Barkan, “Analysis of causes of major train derailment and their effect on accident rates,” *Transp Res Rec*, no. 2289, pp. 154–163, Jan. 2012, doi: 10.3141/2289-20.
- [5] H. Tsunashima and R. Hirose, “Condition monitoring of railway track from car-body vibration using time–frequency analysis,” *Vehicle System Dynamics*, vol. 60, no. 4, pp. 1170–1187, 2022, doi: 10.1080/00423114.2020.1850808.
- [6] A. Winarno *et al.*, “Roles of Vibration-Based Machine Learning Algorithms in Railway Vehicle Monitoring for Track Condition Assessment: A Review,” Apr. 01, 2025, *Springer*. doi: 10.1007/s42417-025-01798-6.
- [7] D. Pogorelov, V. Yazykov, N. Lysikov, E. Oztemel, O. F. Arar, and F. S. Rende, “Train 3D: the technique for inclusion of three-dimensional models in longitudinal train dynamics and its application in derailment studies and train simulators,” *Vehicle System Dynamics*, vol. 55, no. 4, pp. 583–600, Apr. 2017, doi: 10.1080/00423114.2016.1273532.
- [8] R. Ghiasi, M. A. Khan, D. Sorrentino, C. Diaine, and A. Malekjafarian, “An unsupervised anomaly detection framework for onboard monitoring of

- railway track geometrical defects using one-class support vector machine,” *Eng Appl Artif Intell*, vol. 133, Jul. 2024, doi: 10.1016/j.engappai.2024.108167.
- [9] R. I. D. Sandhy, A. A. Ismail, I. Bahiuddin, S. M. N. Cahya, A. Winarno, and A. Dhaniswara, “Vibration Analysis to Detect Anomalies on Railway Track Using Unsupervised Machine Learning,” in *ICSIMA 2023 - 9th IEEE International Conference on Smart Instrumentation, Measurement and Applications*, Institute of Electrical and Electronics Engineers Inc., 2023, pp. 84–88. doi: 10.1109/ICSIMA59853.2023.10373425.
- [10] “Peraturan Perhubungan Republik Indonesia Nomor PM 49 Tahun 2023 tentang Standar, Tata Cara Pengujian, dan Sertifikasi Kelaikan Kereta Api Kecepatan Normal dengan Penggerak Sendiri,” 2023.
- [11] “Peraturan Menteri Perhubungan Republik Indonesia Nomor PM 121 Tahun 2017 tentang Lalu Lintas Kereta Api,” Jakarta, Dec. 2017.
- [12] M. Guerrieri, *Fundamentals of Railway Design*, 1st ed. Trento: Springer Cham, 2023. doi: <https://doi.org/10.1007/978-3-031-24030-0>.
- [13] B. Boston, Basel, and Berlin, *Fundamentals of Multibody Dynamics Theory and Applications*. Birkhauser Boston, 2007.
- [14] S. H-Nia, J. Flodin, C. Casanueva, M. Asplund, and S. Stichel, “Predictive maintenance in railway systems: MBS-based wheel and rail life prediction exemplified for the Swedish Iron-Ore line,” *Vehicle System Dynamics*, vol. 62, no. 1, pp. 3–20, 2023, doi: 10.1080/00423114.2022.2161920.
- [15] V. Petrenko, “Simulation of Railway Vehicle Dynamics in Universal Mechanism Software,” in *Procedia Engineering*, Elsevier Ltd, 2016, pp. 23–29. doi: 10.1016/j.proeng.2016.01.033.
- [16] A. Keylin, U. Spangenberg, N. Wilson, and M. Craft, “Characterization of Track Geometry for Various Operational Conditions,” Washington, DC, Sep. 2023. [Online]. Available: <http://www.fra.dot.gov>
- [17] A. Keylin, “Measurement and Characterization of Track Geometry Data: Literature Review and Recommendations for Processing of Data from FRA ATIP Program,” Washington, DC, Aug. 2023.

- [18] L. Xin, L. Xu, J. Zhang, M. Pei, J. Mao, and D. Wang, “Research on characterization methods for track irregularities,” *Railway Engineering Science*, 2025, doi: 10.1007/s40534-024-00367-z.
- [19] R. Lewis, “Track Geometry Recording and Usage Notes for a lecture to Network Rail,” 2011. [Online]. Available: <https://www.researchgate.net/publication/357381300>
- [20] M. C. Luintel, *Textbook of Mechanical Vibrations*, 1st ed. Springer Singapore, 2024. doi: <https://doi.org/10.1007/978-981-99-3614-4>.
- [21] D. Goyal and B. S. Pabla, “The Vibration Monitoring Methods and Signal Processing Techniques for Structural Health Monitoring: A Review,” *Archives of Computational Methods in Engineering*, vol. 23, no. 4, pp. 585–594, Dec. 2016, doi: 10.1007/s11831-015-9145-0.
- [22] W. T. Thomson, *Theory of Vibration with Applications*, 4th ed. California: Springer US, 1993. doi: 10.1007/978-1-4899-6872-2.
- [23] X. Lei, “Analysis of the influence of the track vertical profile irregularity on the vibration of the vehicle and the track under high speed moving train,” *Transportmetrica B*, vol. 11, no. 1, pp. 896–911, 2023, doi: 10.1080/21680566.2022.2145385.
- [24] L. Jing, K. Wang, and W. Zhai, “Impact vibration behavior of railway vehicles: a state-of-the-art overview,” Aug. 01, 2021, *Springer Verlag*. doi: 10.1007/s10409-021-01140-9.
- [25] Universal Mechanism, “Universal Mechanism: User’s Manual UM Input Program,” 2024.
- [26] Rolling Stock Knowledge Resource, “Suspension System,” Nov. 02, 2021. Accessed: Jun. 29, 2025. [Online]. Available: https://rskr.irimee.in/sites/default/files/Suspension%20system_0.pdf
- [27] “Suspension System.” Accessed: Jul. 08, 2025. [Online]. Available: <https://rskr.irimee.in/sites/default/files/Suspension%20system.pdf>
- [28] M. Varanis, A. Silva, A. Mereles, and R. Pederiva, “MEMS accelerometers for mechanical vibrations analysis: a comprehensive review with

- applications,” *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, vol. 40, no. 11, Nov. 2018, doi: 10.1007/s40430-018-1445-5.
- [29] Z. Hu, A. Lau, J. Dai, and G. T. Frøseth, “Identification of optimal accelerometer placement on trains for railway switch wear monitoring via multibody simulation,” *Front Built Environ*, vol. 10, 2024, doi: 10.3389/fbuil.2024.1396578.
- [30] J. G. . Proakis and D. G. . Manolakis, *Digital Signal Processing*, 4th ed. Essex: Pearson, 2014.
- [31] M. M. Richter, · Sheuli, P. Veton Këpuska, and M. Silaghi, *Signal Processing and Machine Learning with Applications*.
- [32] M. H. Mohd Ghazali and W. Rahiman, “Vibration Analysis for Machine Monitoring and Diagnosis: A Systematic Review,” 2021, *Hindawi Limited*. doi: 10.1155/2021/9469318.
- [33] MATLAB, “Signal Features.” Accessed: Jul. 16, 2025. [Online]. Available: <https://www.mathworks.com/help/predmaint/ug/signal-features.html>
- [34] “Fast Fourier Transformation FFT - Basics.” Accessed: Jul. 08, 2025. [Online]. Available: <https://www.nti-audio.com/en/support/know-how/fast-fourier-transform-fft>
- [35] B. Mahesh, “Machine Learning Algorithms - A Review,” *International Journal of Science and Research (IJSR)*, vol. 9, no. 1, pp. 381–386, Jan. 2020, doi: 10.21275/art20203995.
- [36] A. Mosleh, A. Meixedo, D. Ribeiro, P. Montenegro, and R. Calçada, “Machine learning approach for wheel flat detection of railway train wheels,” in *Transportation Research Procedia*, Elsevier B.V., 2023, pp. 4199–4206. doi: 10.1016/j.trpro.2023.11.354.
- [37] T. H. Wan, C. W. Tsang, K. Hui, and E. Chung, “Anomaly detection of train wheels utilizing short-time Fourier transform and unsupervised learning algorithms,” *Eng Appl Artif Intell*, vol. 122, Jun. 2023, doi: 10.1016/j.engappai.2023.106037.
- [38] B. Scholkopf, R. Williamson, A. Smola, J. Shawe-Taylor, J. Platt, and R. Holloway, “Support Vector Method for Novelty Detection.”

- [39] A. P. Deepak and S. Chouhan, "SVM Kernel Functions for Classification," p. 1, 2013.
- [40] GeeksforGeeks, "Understanding One-Class Support Vector Machines." Accessed: Jul. 01, 2025. [Online]. Available: <https://www.geeksforgeeks.org/machine-learning/understanding-one-class-support-vector-machines/>
- [41] J. Ma and S. Perkins, "Time-series Novelty Detection Using One-class Support Vector Machines," 2003. doi: 10.1109/IJCNN.2003.1223670.
- [42] A. Silik, M. Noori, W. A. Altabey, and R. Ghiasi, "Selecting optimum levels of wavelet multi-resolution analysis for time-varying signals in structural health monitoring," *Struct Control Health Monit*, vol. 28, no. 8, Aug. 2021, doi: 10.1002/stc.2762.