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DAFTAR PUSTAKA

Al Fajar, M. C., Fatmawati, M., Wulandari, P., & Astharini, D. (2020, September). Analysis of dft and fft signal transformation with hamming window in labview. In *2020 2nd International Conference on Broadband Communications, Wireless Sensors and Powering (BCWSP)* (pp. 79-83). IEEE.

Ali, S., Hamid, U., Shehzad, K., Irshad, T. S., Aamir, A., & Ali, S. (2024, December). Design of a Low-Noise, High-Quality Variable Gain Pre-Amplifier for Acoustic Applications. In *2024 26th International Multi-Topic Conference (INMIC)* (pp. 1-6). IEEE.

Arts, L. P., & Van den Broek, E. L. (2022). The fast continuous wavelet transformation (fCWT) for real-time, high-quality, noise-resistant time–frequency analysis. *Nature Computational Science*, *2*(1), 47-58.

Bazylev, P. V., Lugovoi, V. A., Snytko, S. L., Andrianova, N. S., & Rudakov, V. K. (2023). Reference Installation for Complex Measurements of the Acoustic Parameters of Solids. *Measurement Techniques*, *66*(2), 134-142.

Benaicha, M., Jalbaud, O., & Burtschell, Y. (2025). Ultrasonic characterization and mechanical performance of self-compacting concrete in fresh and hardened states. *Ultrasonics*, *152*, 107657.

Bühling, B., Küttenbaum, S., Maack, S., & Strangfeld, C. (2022). Development of an accurate and robust air-coupled ultrasonic time-of-flight measurement technique. *Sensors*, *22*(6), 2135.

Forbacha, S. C., & Anagho, W. M. B. M. (2021). Design and Implementation of a Security Communication System for a Local Area: Case Study the University of Bamenda. *International Journal of Human Computing Studies*, *3*(1), 52-73.

Gunasekaran, P., Alamdari, M. M., & Goudarzi, H. V. P. (2024). Ultrasonic based defect detection in steel-reinforced laminated timber structural elements using Uniform Manifold Approximation and Projection (UMAP). Automation in Construction, 160, 105296.

Guo, Z., Peng, J., Luo, B., Ma, A., & Zheng, X. (2024). Design, Analysis, and Implementation of a Frequency Modulation Receiver System with Enhanced Audio Power Amplification. *International Core Journal of Engineering*, *10*(5), 463-470.

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Gupta, R., Mitchell, D., Blanche, J., Harper, S., Tang, W., Pancholi, K., ... & Flynn, D. (2021). A review of sensing technologies for non-destructive evaluation of structural composite materials. *Journal of Composites Science*, *5*(12), 319.

Hillig, É., Bobadilla, I., Arriaga, F. and Íñiguez-González, G., 2024. Using acoustic testing to estimate strength and stiffness of wood-polymer composites. Maderas. Ciencia y tecnología, 26.

Hiremath, N., Kumar, V., Motahari, N., & Shukla, D. (2021). An overview of acoustic impedance measurement techniques and future prospects. *Metrology*, *1*(1), 17-38.

Jain, H., Tarpara, E. G., & Patankar, V. H. (2020). Design and development of ultrasonic bipolar square-wave pulser for *Non-Destructive Testing* of concrete structures. *Review of Scientific Instruments*, *91*(9).

Jedidi, M. (2022). Evaluation of concrete by non-destructive ultrasonic pulse velocity method. Civil Engineering and Architecture, 10(4), 1623-1630.

Kachanov, V. K., Sokolov, I. V., Samokrutov, A. A., Shevaldykin, V. G., Fedorenko, S. A., Alekhin, S. G., ... & Pichugin, N. K. (2021). *Through-transmission* Impact Method for Measuring Sound Vibration Velocity in Compact Concrete Cubic Samples. *Measurement Techniques*, *64*, 511-515.

Kumar, A., & Arnold, W. (2022). High resolution in non-destructive testing: A review. *Journal of Applied Physics*, *132*(10).

Kumar, G. G., Sahoo, S. K., & Meher, P. K. (2019). 50 years of FFT algorithms and applications. *Circuits, Systems, and Signal Processing*, *38*, 5665-5698.

Lencis, U., Udris, A., Kara De Maeijer, P., & Korjakins, A. (2024). Methodology for determining the correct ultrasonic pulse velocity in concrete. Buildings, 14(3), 720.

Li, H., Li, S., Sun, J., Huang, B., Zhang, J., & Gao, M. (2024). Ultrasound signal processing based on joint GWO-VMD wavelet threshold functions. Measurement, 226, 114143.

Li, Z., Xu, H., Jiang, B., & Han, F. (2023). Wavelet threshold ultrasound echo signal denoising algorithm based on CEEMDAN. Electronics, 12(14), 3026.

Lusiana, L., Gunawan, A. I., & Dewantara, B. S. B. (2019). Pengukuran *speed* dan impedansi akustik pada tanah liat dengan memanfaatkan sinyal echo ultrasonik. Jurnal Rekayasa Elektrika, 15(2).

Machorro-Lopez, J. M., Hernandez-Figueroa, J. A., Carrion-Viramontes, F. J., Amezquita-Sanchez, J. P., Valtierra-Rodriguez, M., Crespo-Sanchez, S. E., ... & Martinez-Trujano, L. A. (2023). Analysis of acoustic emission signals

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processed with wavelet transform for structural damage detection in concrete beams. Mathematics, 11(3), 719.

Masoudimoghaddam, M., Yazdi, J., & Shahsavandi, M. (2025). A low-cost ultrasonic sensor for online monitoring of water levels in rivers and channels. *Flow Measurement and Instrumentation*, *102*, 102777.

Mateo, C., & Talavera, J. A. (2020). Bridging the gap between the short-time Fourier transform (STFT), wavelets, the constant-Q transform and multi-resolution STFT. *Signal, Image and Video Processing*, *14*(8), 1535-1543.

Mousavi, M., Gandomi, A. H., Holloway, D., Berry, A., & Chen, F. (2022). Machine learning analysis of features extracted from time–frequency domain of ultrasonic testing results for wood material assessment. *Construction and Building Materials*, *342*, 127761.

Nanayakkara, O., Najm, H. M., & Sabri, M. M. S. (2022). Effect of using steel bar reinforcement on concrete quality by ultrasonic pulse velocity measurements. Materials, 15(13), 4565.

Nozdrachova, K. L., Slobodchuk, A. Y., Suchkov, G. M., Migushchenko, R. P., & Kropachek, O. Y. (2020). Power Supplies of High-Frequency Capacitive Transducers for Measurement, Monitoring, and Diagnostics of Metal Products. *Russian Journal of Nondestructive Testing*, *56*, 242-248.

Pei, X., Wang, Q., Zhao, P., & Lv, Y. (2024). Ultrasonic monitoring of cement setting based on embedded sensor. Advances in Engineering Technology Research, 9(1), 246-246.

Piyush, P., Dhiman, N., Kumar, B., Yadav, S., & Dubey, P. K. (2023). Measurement of ultrasonic pulse velocity with improved accuracy using automatic threshold error correction. Review of Scientific Instruments, 94(4).

Piyush, Yadav, S., & Dubey, P. K. (2024). Metrological Perspective of Ultrasonic Pulse Velocity Measurement Technique. MAPAN, 39(4), 1045-1052.

Purwanto, P., & Ro'uf, A. (2018). Sistem Pengukuran Modulus Elastisitas Beton Menggunakan Metode Ultrasonic Pulse Velocity. *Indonesian Journal of Electronicsand Instrumentation Systems (IJEIS)*, *8*(1).

Robhani, H. A., & Ro'uf, A. (2018). Perancangan Flowmeter Ultrasonik untuk Mengukur Debit Air Pada Pipa. *IJEIS (Indonesian Journal of Electronics and Instrumentation Systems)*, *8*(1), 83-94.

Schäfer, M. W., & Fischer, S. C. (2024). Inverse stimulation enables ultrasonic binary coding for NDE using a custom linear testing system. *Ultrasonics*, *141*, 107341.

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Stepanov, A. (2021). Polynomial, neural network, and spline wavelet models for continuous wavelet transform of signals. *Sensors*, *21*(19), 6416.

Tian, Y., Wu, J., Liu, S., Ling, J., Zheng, Y., Zhao, X., & Liu, L. (2023). Accurate Detection of Concrete Pavement Thickness Based on Ultrasonic Array. Sustainability, 15(10), 8228.

Turner, B. L., Senevirathne, S., Kilgour, K., McArt, D., Biggs, M., Menegatti, S., & Daniele, M. A. (2021). Ultrasound-powered implants: a critical review of piezoelectric material selection and applications. *Advanced healthcare materials*, *10*(17), 2100986.

Xu, X., Ran, B., Jiang, N., Xu, L., Huan, P., Zhang, X., & Li, Z. (2024). A systematic review of ultrasonic techniques for defects detection in construction and building materials. *Measurement*, *226*, 114181.

Yang, F., Shi, D., Lo, L. Y., Mao, Q., Zhang, J., & Lam, K. H. (2023). Auto-diagnosis of time-of-flight for ultrasonic signal based on defect peaks tracking model. Remote Sensing, 15(3), 599.

Yang, H., Song, Z., Zhao, X., Zhou, F., Zhao, S., & Ran, Q. (2023). Ultrasonic visualization and quantitative analysis of internal defects in RTV coatings. Heliyon, 9(10).

Zhang, Q., Zhang, G., Luo, L., Liu, Z., Zhu, Y., Fan, Z., ... & Tu, J. (2024). Improved assessment sensitivity of time-varying cavitation events based on wavelet analysis. *Ultrasonics*, *138*, 107227.