

Title: A hybrid MLS technique for room impulse response estimation

Author(s): Paulo, Joel Preto ^[1,3]; Martins, Carlos Rodrigues ^[2]; Bento Coelho, J. L. ^[3]

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Abstract: The measurement of room impulse response (RIR) when there are high background noise levels frequently means one must deal with very low signal-to-noise ratios (SNR). If such is the case, the measurement might yield unreliable results, even when synchronous averaging techniques are used. Furthermore, if there are non-linearities in the apparatus or system time variances, the final SNR can be severely degraded. The test signals used in RIR measurement are often disturbed by non-stationary ambient noise components. A novel approach based on the energy analysis of ambient noise - both in the time and in frequency - was considered. A modified maximum length sequence (MLS) measurement technique, referred to herein as the hybrid MLS technique, was developed for use in room acoustics. The technique consists of reducing the noise energy of the captured sequences before applying the averaging technique in order to improve the overall SNRs and frequency response accuracy. Experiments were conducted under real conditions with different types of underlying ambient noises. Results are shown and discussed. Advantages and disadvantages of the hybrid MLS technique over standard MLS technique are evaluated and discussed. Our findings show that the new technique leads to a significant increase in the overall SNR. (C) 2008 Elsevier Ltd. All rights reserved.

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Reprint Address: Paulo, JP (reprint author) - Inst Super Engn Lisboa, P-1959007 Lisbon, Portugal.

Addresses:

[1] Inst Super Engn Lisboa, P-1959007 Lisbon, Portugal

[2] Escola Naut Infante D Henrique, P-2780 Oeiras, Portugal

[3] Univ Tecn Lisboa, Inst Super Tecn, CAPS, P-1049001 Lisbon, Portugal

E-mail Addresses: jpaulo@deetc.isel.pt

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