

Loudspeaker Parameters Inverse Problem for Improving Sound Frequency Response Simulation

Authors : Y. T. Tsai, Jin H. Huang

Abstract : The sound pressure level (SPL) of the moving-coil loudspeaker (MCL) is often simulated and analyzed using the lumped parameter model. However, the SPL of a MCL cannot be simulated precisely in the high frequency region, because the value of cone effective area is changed due to the geometry variation in different mode shapes, it is also related to affect the acoustic radiation mass and resistance. Herein, the paper presents the inverse method which has a high ability to measure the value of cone effective area in various frequency points, also can estimate the MCL electroacoustic parameters simultaneously. The proposed inverse method comprises the direct problem, adjoint problem, and sensitivity problem in collaboration with nonlinear conjugate gradient method. Estimated values from the inverse method are validated experimentally which compared with the measured SPL curve result. Results presented in this paper not only improve the accuracy of lumped parameter model but also provide the valuable information on loudspeaker cone design.

Keywords : inverse problem, cone effective area, loudspeaker, nonlinear conjugate gradient method

Conference Title : ICMAME 2014 : International Conference on Mechanical, Aeronautical and Manufacturing Engineering

Conference Location : London, United Kingdom

Conference Dates : August 21-22, 2014