

AN ENVIRONMENT FOR PERFORMANCE ASSESMENT OF ACTIVE NOISE CONTROL IN 3D FREE-FIELD PROPAGATION

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Abstract

There are considerable research efforts in noise control using passive and active control methods. Passive absorption is more suitable for higher frequencies and active control more for lower frequencies. Active noise control (ANC) uses the superposition of sound waves so as to achieve destructive interference. The realisation of this concept however poses practical challenges. This is due to non-linear and time-varying nature of practical systems. Accordingly great deal of interest has been shown in developing suitable modelling and control structures in this context. In this paper, an analysis of the process of noise cancellation in a three-dimensional nondispersive (linear) propagation medium for ANC applications is presented. The work is based on a feedforward control structure using a fixed control algorithm. The physical extent of cancellation is shown to be dependent on the geometrical arrangement of system components. Accordingly, a simulation environment incorporating a graphical user-interface is developed using Matlab and C programming for assessment and geometrical design of ANC systems incorporating single and multiple sources. The environment allows the user to specify the arrangement of system components and provides the response of the system to user-specified disturbances in the frequency domain. The program can be used to calculate and graphically show noise cancellation or reinforcement in two or three dimensions. The environment thus developed forms a useful interactive learning and education facility.