KAJIMA CORPORATION

ANC-Labo
Active Noise Control

ANC-Duo

< KAJIMA-style >
Active Noise Control Technology

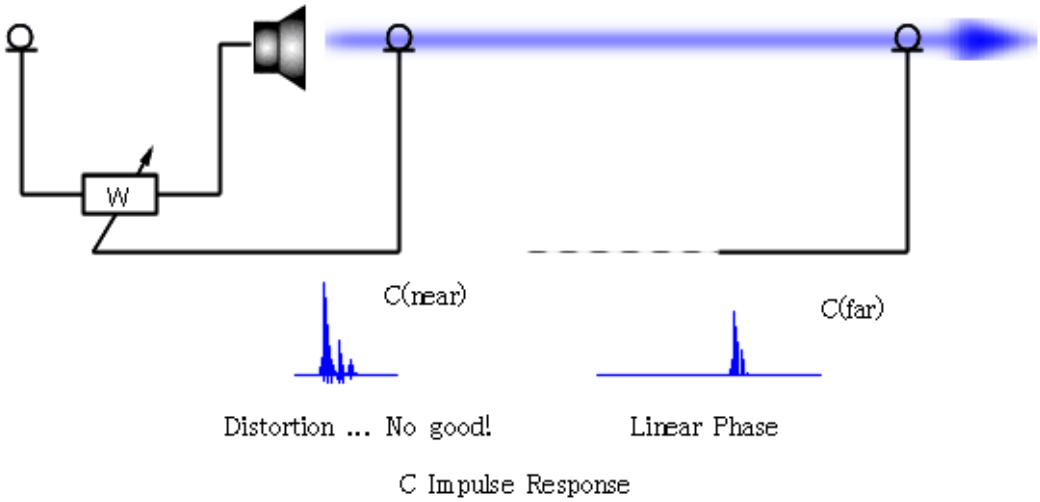
Virtual point to be controlled (Virtual microphone)

ANC-Duo is an active noise control system with the accumulated technology developed by KAJIMA Corporation and ANC-Labo Inc. It has several advanced features to make the system effective, compact and reliable. Especially Virtual Microphone technique holds a patent by KAJIMA Corporation.

Usually, an error microphone (the microphone at a controlled and estimated point) should be placed appropriately far from the control speaker (the far-field). But, sometimes its location is limited to an area near the speaker (the near-field) due to the system size. If the error microphone is set close to the control speaker, the control effect appears only at the area near the error microphone, not till the far end because of the following reasons.

a) The sound field near the speaker (the near-field) is linearly turbulent due to the mechanical structure driving the diaphragm and supporting itself. The microphone near the speaker cannot be used for controlling downstream.

b) Sound power decays exponentially with distance. It needs only tiny sound power to control the field near the speaker (the near-field). To control the far end (the far-field), much more power is needed.



C Impulse Response

The control software, which runs on ANC-Duo, solves this problem and makes ANC system a compact one.

Recipe) First, set an error microphone at a far end (a far-field), and measure the secondary transfer function C (far). It does not cause a big problem even if C (far) characteristically changes afterwards. The far end transfer function could be explained as a transfer function which is the result when one transfer function near the control speaker is shifted with power-decreasing and phase-increasing by distance. Inversely, C (far) can be back-shifted to an area near the control speaker (the near-field) because of its linearity. Back-shift the impulse-like part of C (far) and compose C (near) transfer function. Use C (near) instead of C (far) in the W-updating algorithm for the control. In this method, there is no effect around the area near the error microphone, and it even gets worse, but the reduction field spreads widely at the far end. This means just controlling a VIRTUAL FAR point, where there is a Virtual Microphone.

Using this method, as well as being able to make the system compact, you will get an outgrowth as follows. To achieve maximum effect, the noise source, the secondary sound source and the error microphone align on one straight line (called a control line). The reduction area spreads downstream of the virtual control point and the effective result can be expected. When the noise source moves out of the control line, decreasing control effect might be expected. But, the distance between the reference signal input point and control signal output point is very little compared with the distance between the noise source and the control point which spreads far, so the controller input-output distance seems to be a very tiny point. When the noise source moves, the control area also moves to the point-symmetry direction around the controller as the origin, sustaining the width of the reduction zone.

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