

개인 음향 공간을 위한 음향 차이 제어 및 빔 형성에 근거한 공간 변수 설계 방법

Acoustic difference control and the design method of the acoustic zone based on array beam pattern for a personal audio space

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1.

(Loudspeaker Array)

가
(Sound Focusing)

()
()

(),
()

(1)

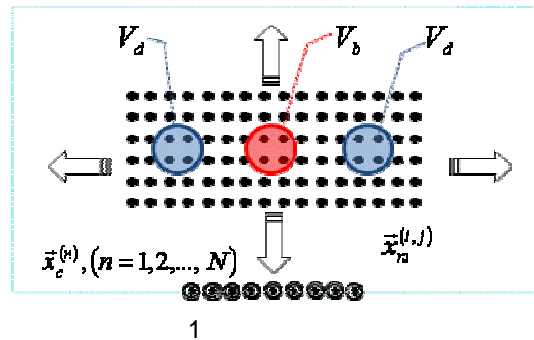
Control)

(Acoustic Difference

/

2.1

1 N
(V_b) (V_d)



V (1)

$$\mathbf{R}_V = \frac{1}{V} \int_V \hat{G}(\bar{x}_m^{(i,j)} | \bar{x}_c) \hat{G}(\bar{x}_m^{(i,j)} | \bar{x}_c) dV \quad (1)$$

Green

(2)

$$\hat{G}(\bar{x}_m^{(i,j)} | \bar{x}_c) = -\frac{j\omega\rho}{4\pi\bar{r}} \exp\left(-\frac{j\omega\bar{r}}{c}\right), \bar{r} = \sqrt{(\bar{x}_c - \bar{x}_m^{(i,j)})^2} \quad (2)$$

ρ , ω , c

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(GIST)
** (ETRI)

3.2

(3)

(4)

$$e_v = \vec{q}_c^H \mathbf{R}_v \vec{q}_c \quad (3)$$

$$J_0 = \vec{q}_c^H \vec{q}_c \quad (4)$$

2.2

(5)

(V_b)

(V_d)

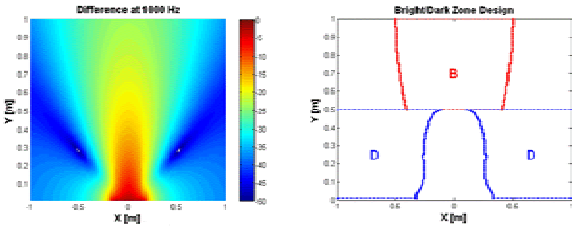
$$\gamma = \frac{e_b}{J_0} - \frac{e_d}{J_0} = \frac{\vec{q}_c^H (\mathbf{R}_b - \mathbf{R}_d) \vec{q}_c}{\vec{q}_c^H \vec{q}_c} \quad (5)$$

(5)

가

3.

3.1



2

가

(2)

2

(5)

-50~0dB

(0.5)

(1)

2 1kHz design

(uncontrolled, contrast)
(difference, design)

90

(6)

$$Q_j = 20 \log_{10} \left(\frac{P_{at90^\circ} - P_j}{P_{ref}} \right) \quad (6)$$

(6)

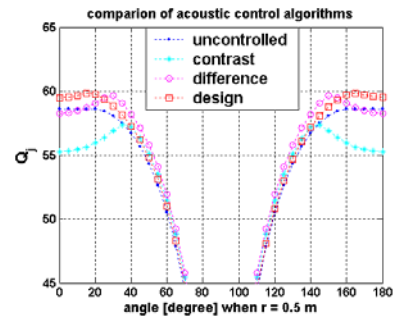
0~180

0.5

3 9
4 가

4cm

Q_j



3

4.

3 difference 가
, design 0 180

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(1) Joung-Woo Choi, and Yang-Hann Kim, "Generation of an acoustically bright zone with an illuminated region using multiple sources", J. Acoust. Soc. Am. 111 (4), pp. 1695~1700, April 2002

(2) , , , TV , , 18 7 , pp. 701~710, 2008