

**Fig.1**

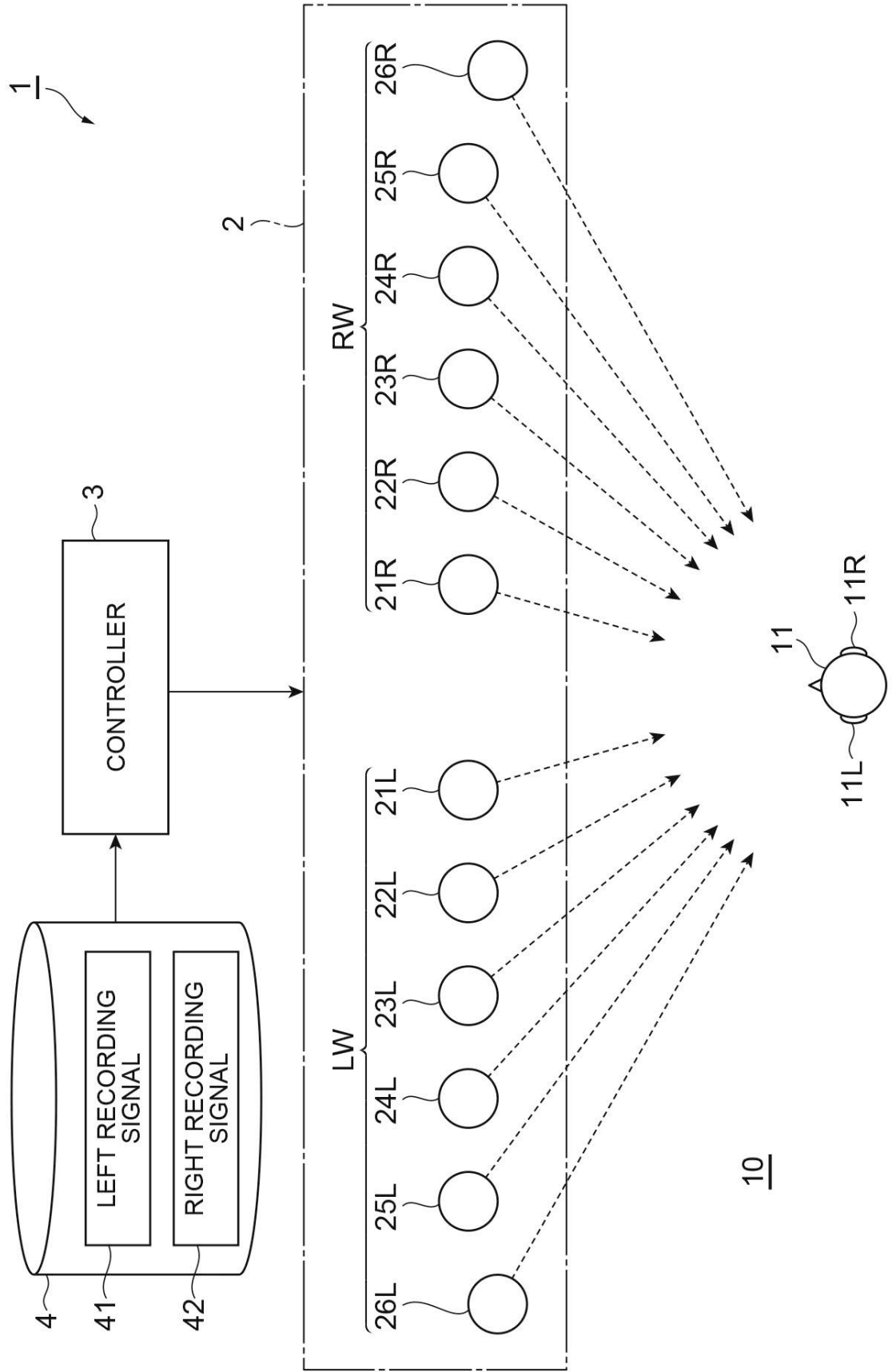
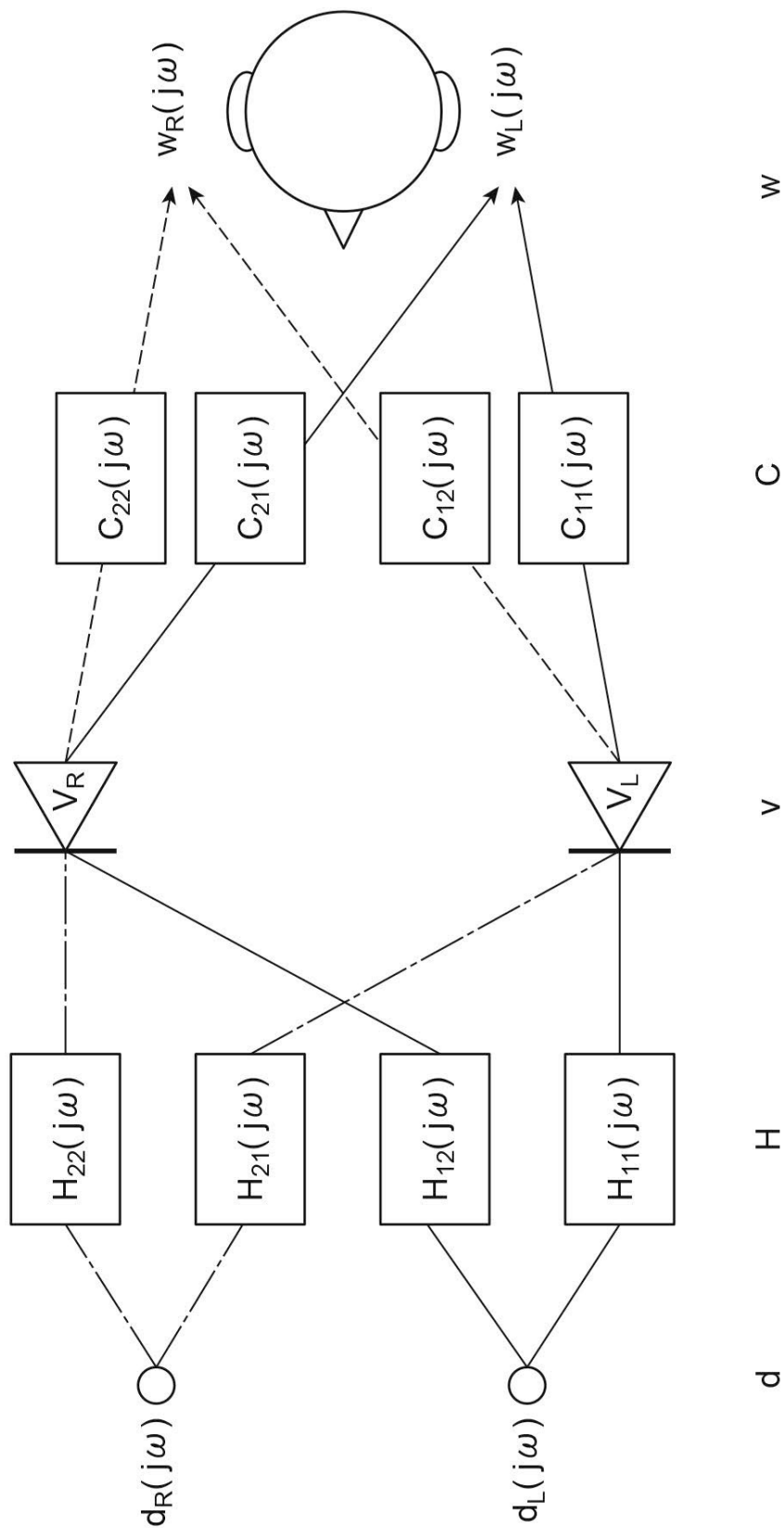
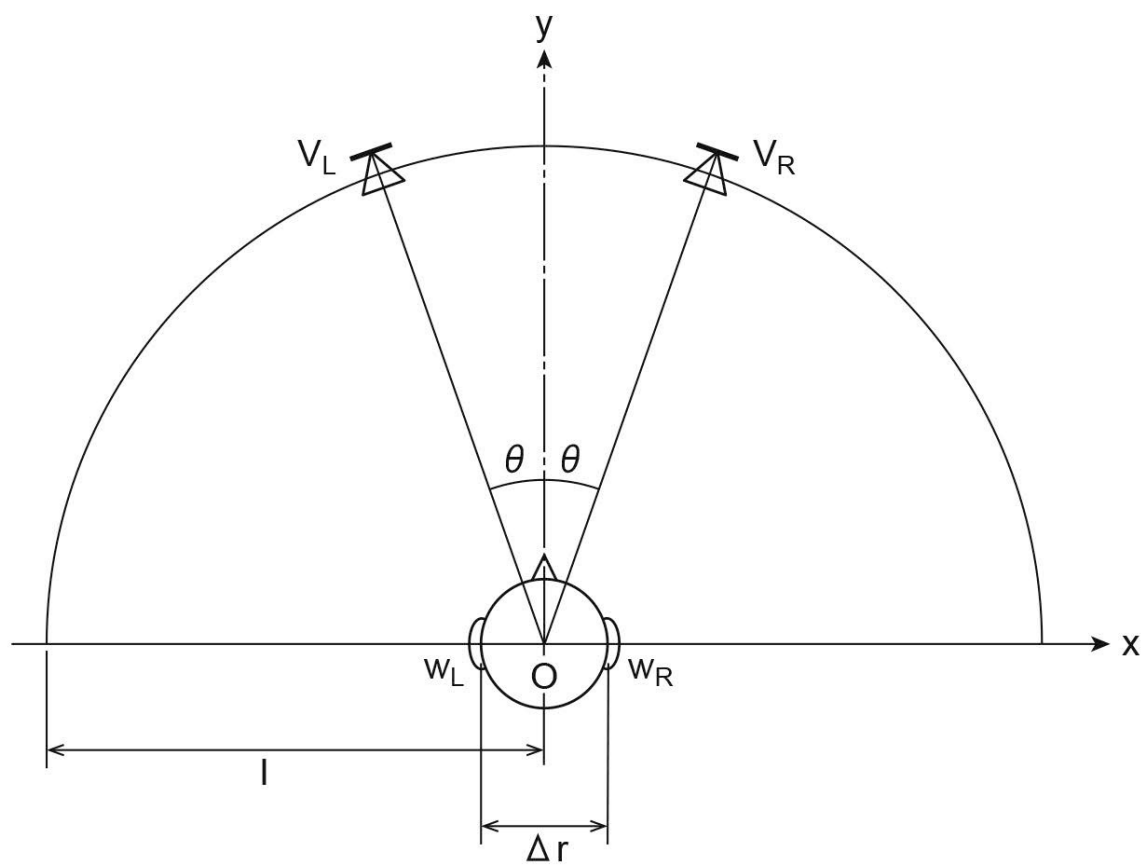
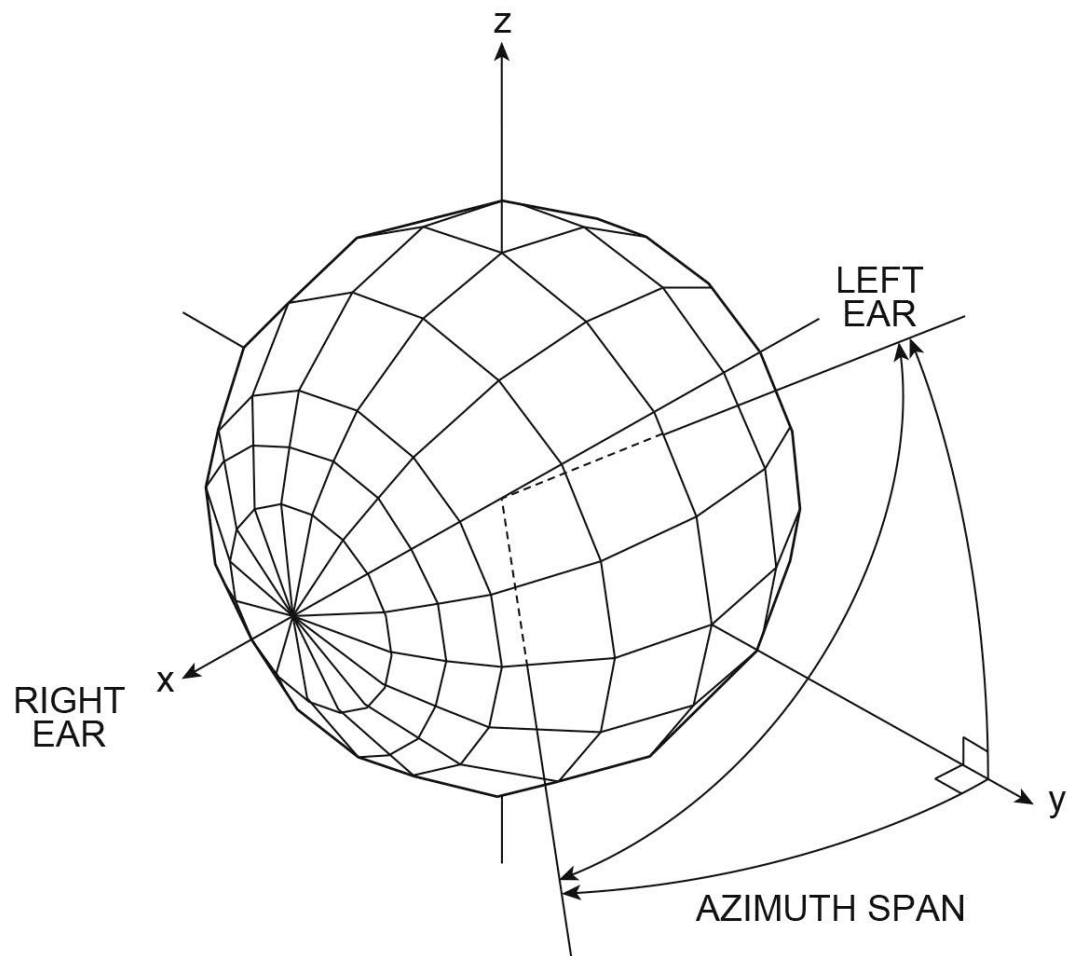


Fig.2

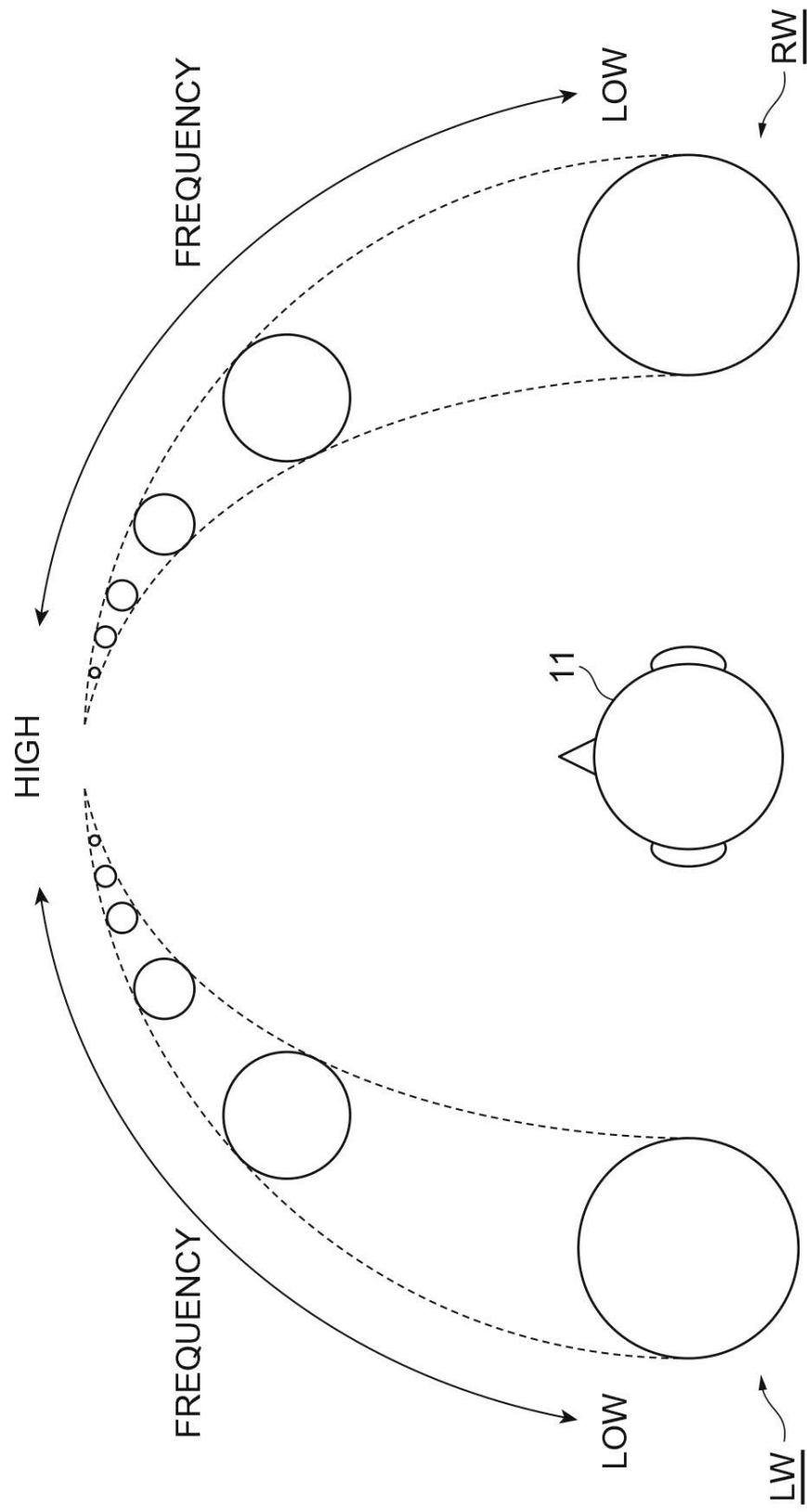


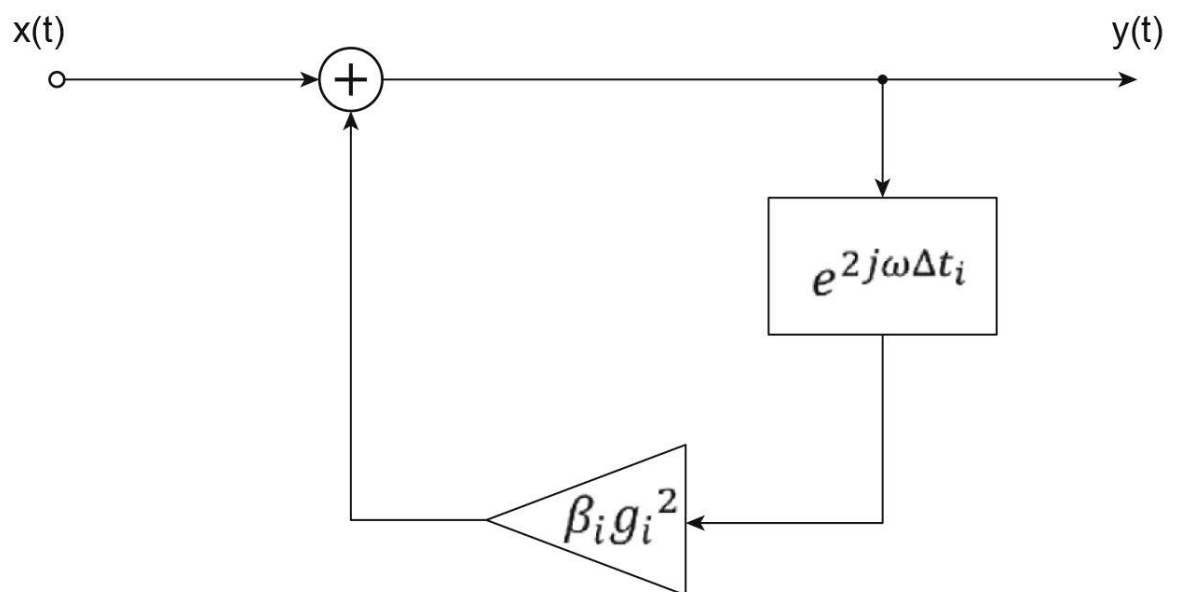
**Fig.3**

**Fig.4**



**Fig.5**



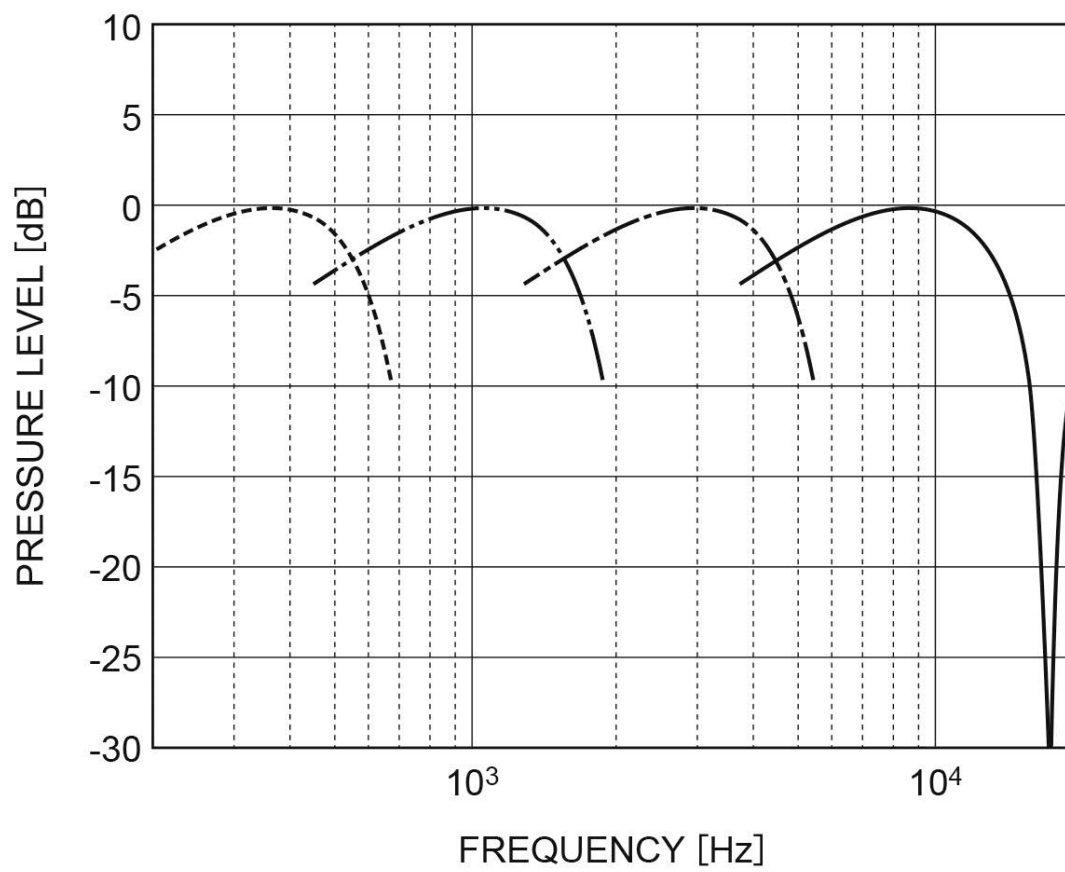
**Fig.6**

**Fig.7**

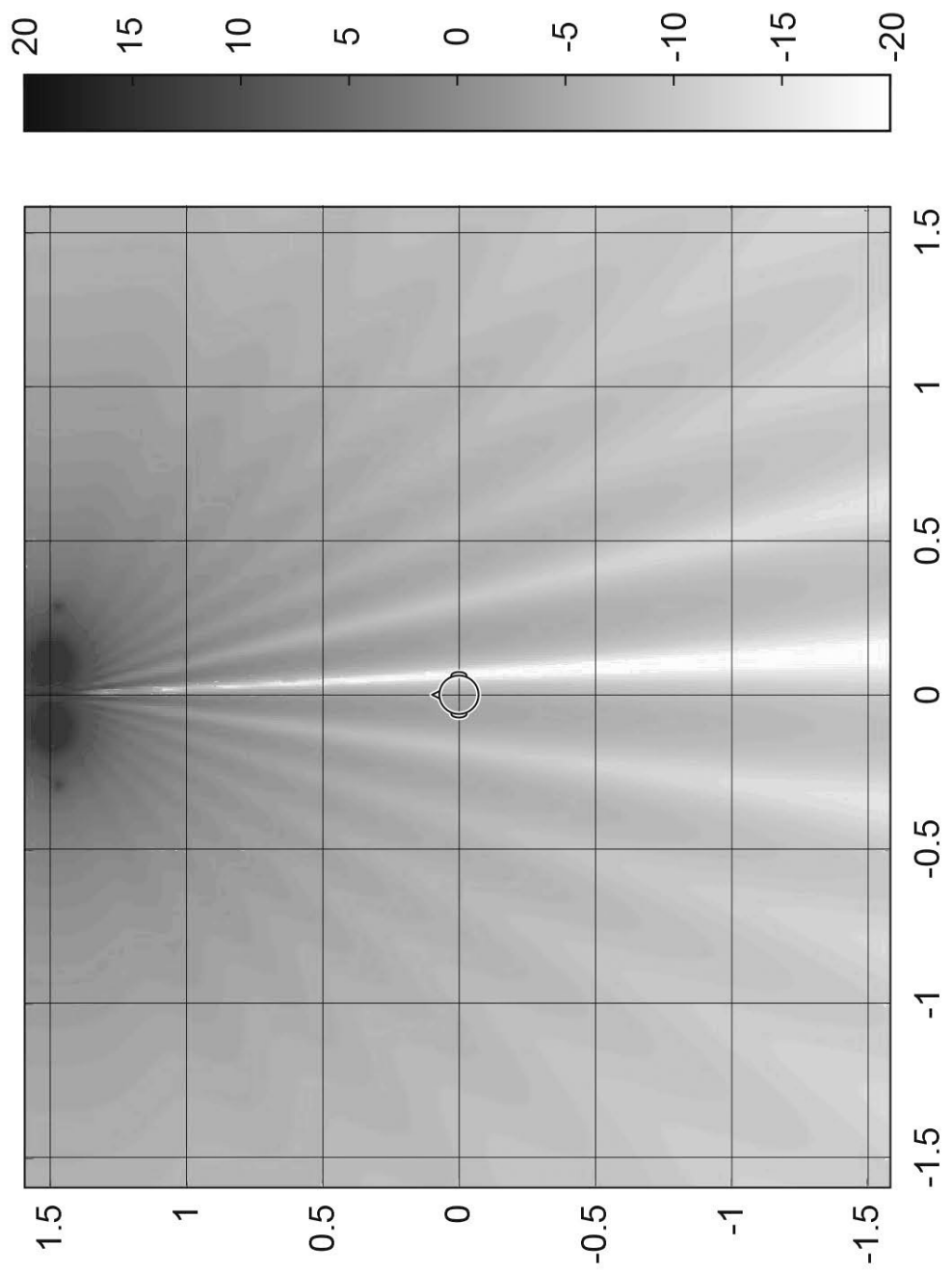
| INVERSE FILTER<br>MATRIX $H_i$<br>(THEORETICAL<br>VALUE) | $a_i$                                                                        | $G_i$                                                                          | $R_i$                                                                                                         | $D_i$                                                                                                     |
|----------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|                                                          | $\frac{1}{1 - g_i^2 e^{-2jk\Delta t_i}}$                                     | $\begin{pmatrix} 1 & g_i \\ g_i & 1 \end{pmatrix}$                             | $\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$                                                              | $\begin{pmatrix} 1 & e^{-jk\Delta t_i} \\ e^{-jk\Delta t_i} & 1 \end{pmatrix}$                            |
| FIRST<br>IMPLEMENTATION<br>METHOD M1                     | AMPLIFICATION CIRCUIT<br>$\frac{1}{1 + g_i^2}$                               | AMPLIFICATION CIRCUIT<br>$\begin{pmatrix} 1 & g_i \\ g_i & 1 \end{pmatrix}$    | DELAY CIRCUIT<br>$\begin{pmatrix} 1 & e^{-j\omega\pi/\omega_i} \\ e^{-j\omega\pi/\omega_i} & 1 \end{pmatrix}$ | DELAY CIRCUIT<br>$\begin{pmatrix} 1 & e^{-j\omega\Delta t_i} \\ e^{-j\omega\Delta t_i} & 1 \end{pmatrix}$ |
| SECOND<br>IMPLEMENTATION<br>METHOD M2                    | AMPLIFICATION CIRCUIT<br>$\frac{1}{1 + g_i^2}$                               | AMPLIFICATION CIRCUIT<br>$\begin{pmatrix} 1 & g_i \\ g_i & 1 \end{pmatrix}$    | INVERSION<br>CIRCUIT<br>$\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$                                      | DELAY CIRCUIT<br>$\begin{pmatrix} 1 & e^{-j\omega\Delta t_i} \\ e^{-j\omega\Delta t_i} & 1 \end{pmatrix}$ |
| THIRD<br>IMPLEMENTATION<br>METHOD M3                     | FEEDBACK<br>CIRCUIT<br>$\frac{1}{1 - \beta_i g_i^2 e^{-2j\omega\Delta t_i}}$ | AMPLIFICATION<br>CIRCUIT<br>$\begin{pmatrix} 1 & g_i \\ g_i & 1 \end{pmatrix}$ | DELAY CIRCUIT<br>$\begin{pmatrix} 1 & e^{-j\omega\pi/\omega_i} \\ e^{-j\omega\pi/\omega_i} & 1 \end{pmatrix}$ | DELAY CIRCUIT<br>$\begin{pmatrix} 1 & e^{-j\omega\Delta t_i} \\ e^{-j\omega\Delta t_i} & 1 \end{pmatrix}$ |
| FOURTH<br>IMPLEMENTATION<br>METHOD M4                    | FEEDBACK<br>CIRCUIT<br>$\frac{1}{1 - \beta_i g_i^2 e^{-2j\omega\Delta t_i}}$ | AMPLIFICATION<br>CIRCUIT<br>$\begin{pmatrix} 1 & g_i \\ g_i & 1 \end{pmatrix}$ | INVERSION<br>CIRCUIT<br>$\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$                                      | DELAY CIRCUIT<br>$\begin{pmatrix} 1 & e^{-j\omega\Delta t_i} \\ e^{-j\omega\Delta t_i} & 1 \end{pmatrix}$ |

**Fig.8**

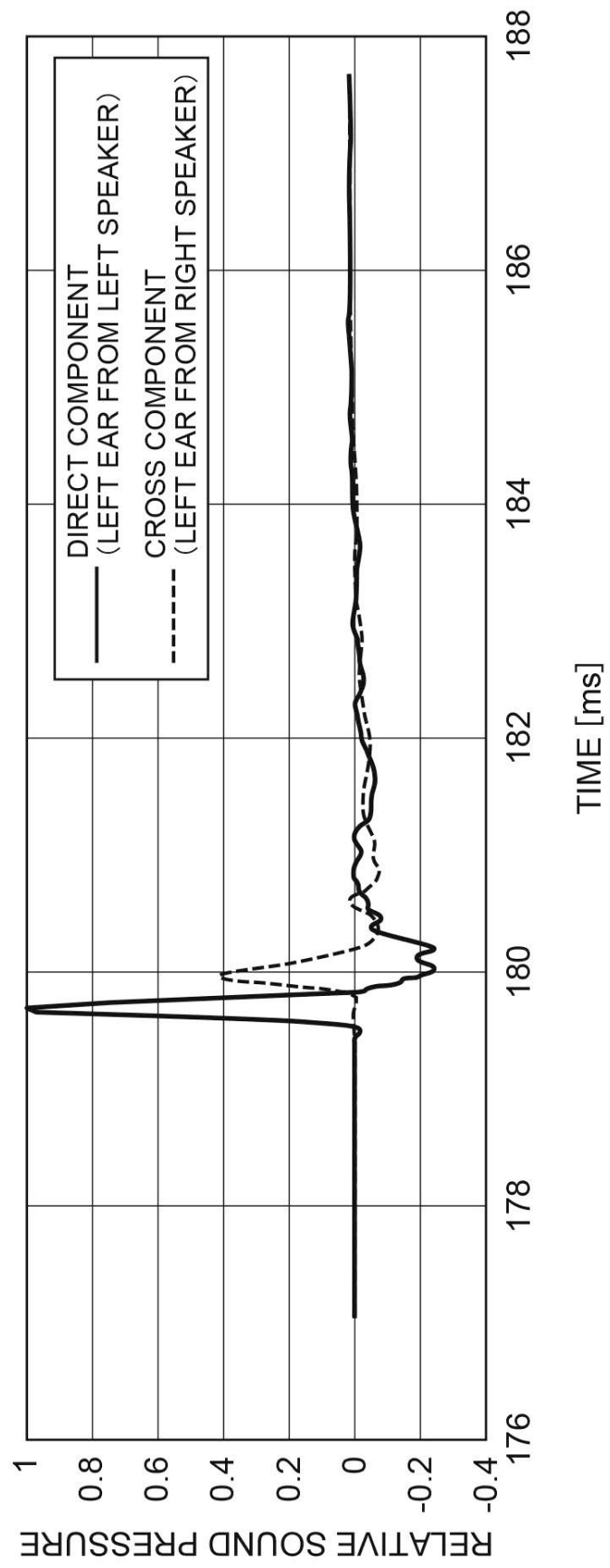
| <div>EVALUATION<br/>ITEMS</div> <div>SYSTEM</div>                                                | SIMPLICITY OF<br>THEORY | ACCURACY OF<br>INVERSE SYSTEM | LOWNESS OF<br>CIRCUIT<br>IMPLEMENTATION<br>COST | SIMPLICITY OF<br>INVERSE<br>SYSTEM DESIGN |
|--------------------------------------------------------------------------------------------------|-------------------------|-------------------------------|-------------------------------------------------|-------------------------------------------|
| COMPARATIVE EXAMPLE<br>(SOUND SOURCE DISCRETIZED<br>SYSTEM IMPLEMENTED<br>INVERSE FILTER MATRIX) | A                       | A                             | C                                               | C                                         |
| FIRST<br>IMPLEMENTATION<br>METHOD M1                                                             | B                       | C                             | A                                               | A                                         |
| SECOND<br>IMPLEMENTATION<br>METHOD M2                                                            | B                       | B                             | A                                               | A                                         |
| THIRD<br>IMPLEMENTATION<br>METHOD M3                                                             | B                       | B                             | B                                               | B                                         |
| FOURTH<br>IMPLEMENTATION<br>METHOD M4                                                            | B                       | B                             | B                                               | B                                         |

**Fig.9**

**Fig.10**



**Fig.11**



**Fig.12**

